SEPTEMBER 22, 1952

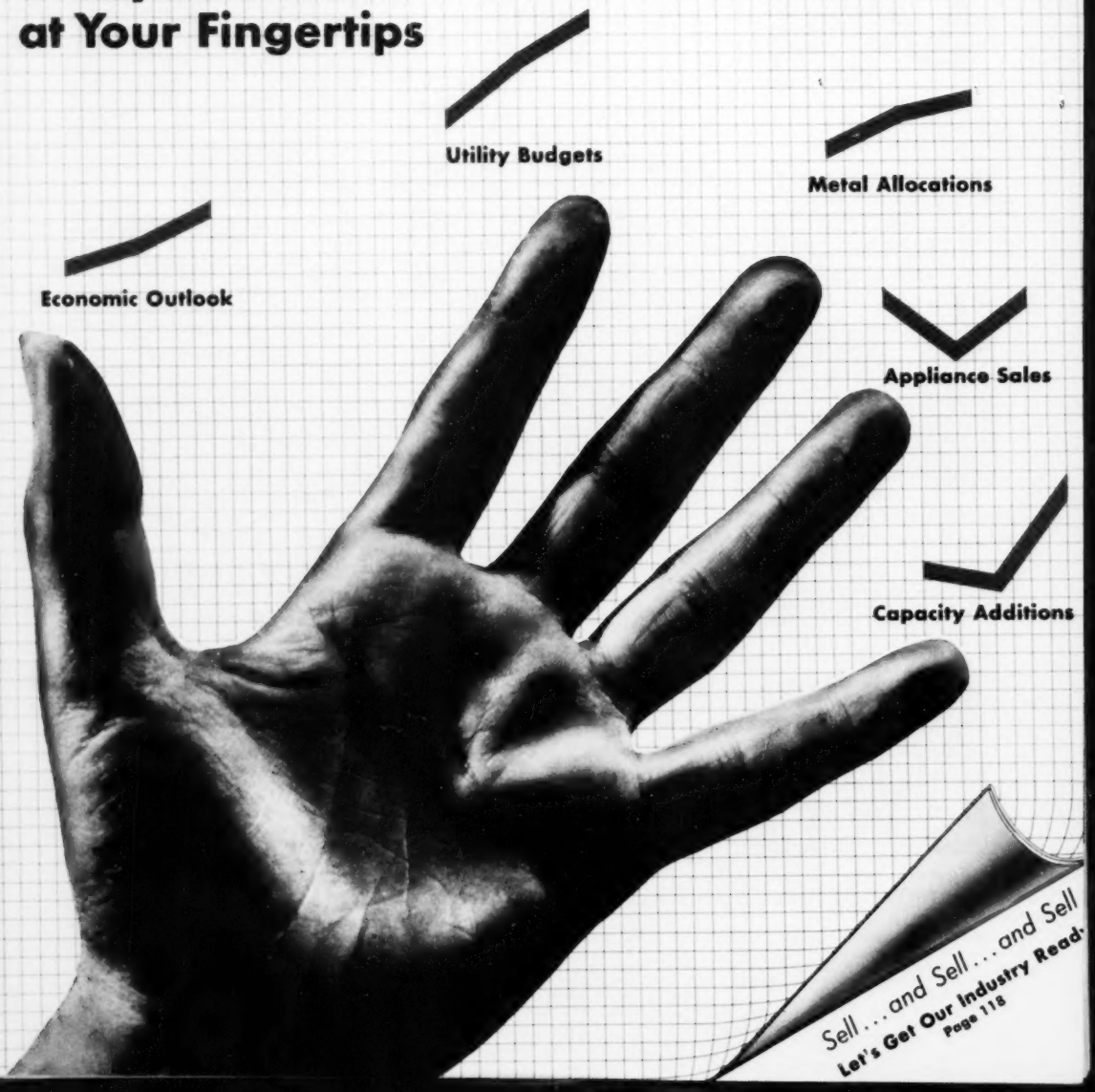
FOR THIS WEEK'S NEWS-SEE PAGE 107

# Electrical World

Price 35 Cents

A McGRAW-HILL PUBLICATION

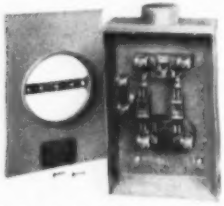
## Utility Forecast at Your Fingertips



# SIMPLIFY your meter mounting problems....choose from the COMPLETE Murray line

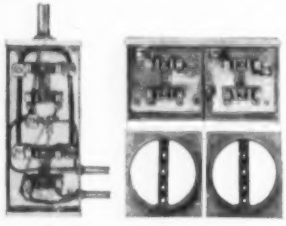
## OUTDOOR METER SOCKET

**Single or multiple units (saves nippling in the field). Provisions for fifth and sixth jaws. Reversible jaws for vertical or horizontal mounting. Two or three hubs—1" or 1¼". Pressure connectors. Finished in gray baked-on Melamine (a really rugged finish).**



## OUTDOOR WEATHERPROOF—RAINTIGHT METER SOCKETS

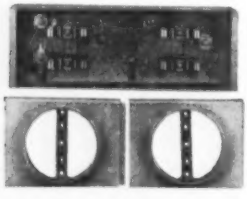
**A medium duty socket. Contact surfaces of jaws are silver plated. Single phase installation can be converted to polyphase by substituting polyphase blocks. Sturdy cabinet, built of corrosion resistant steel. The finish is baked-on Melamine. Deep lipped top with hub for 2" conduit, is welded to sides and back. Cover slides under top, over sides and bottom, making device completely raintight. An economical unit.**



## OUTDOOR SOCKET METER TROUGHS

**(Vertical or Horizontal)—**

**Single or multiple units. On multiple units, line and load terminals at each meter position are lay-in pressure type connectors, which simplify bussing. Line connectors for #4 to #3/0 cables. Load connectors for #4 to #1/0 cables. Made in sizes to accommodate from one to six meters.**



## INDOOR SOCKET METER TROUGH

**(Horizontal)—**

**Available in one to three meter positions. Can be ganged readily. Line and load terminals are pressure type. Line connectors for #4 to #3/0 cables, load connectors for #4 to #1/0 cables. Lay-in connectors simplify wiring.**

## TYPE H. D. HEAVY DUTY METER MOUNTING DEVICE

**Has a maximum continuous carrying capacity up to 200 Amperes. Can be used with any standard 4 or 5 terminal meter on 1, 2 or 3 phase, 3 wire installations. Where the standard 50 Ampere meter is used, the heavy duty mounting is suitable for 200 Amperes intermittent duty and 150 Amperes continuous duty Visejaw terminals for high-strength, high conductivity. Pressure connectors take line conductor sizes from #6 to #4/0. Equipped with transparent acetate shield for safety in installation and testing. By-pass clamps permit removal or testing of meter without interrupting load. Corrosion resistant, weatherproof case. Supplied with 2" or 2½" hubs.**

## MODIFIED OUTDOOR SOCKET METER TROUGH

**An economical device for those whose requirements call for a compact, single position unit. Plenty of wiring room. All connectors are pressure type and take up to #1 wire. 1" or 1¼" hubs available. Melamine finish.**

## COMBINATION METER SOCKET AND SERVICE CONTROL EQUIPMENT

**Murray meter sockets are available in combination with service control equipment. Factory assembly assures a rock-solid, perfectly aligned unit. Service control equipment includes Fully Magnetic Circuit Breakers. Murray Magnetic Breakers always carry the full load, are never affected by ambient temperatures. The sun's rays, for instance, will never cause Murray Breakers to trip. Both socket and service control equipment are finished in baked-on gray Melamine.**

**Murray can fill all your needs for socket type meter mounting equipment. You can choose any device you need—from the round socket to heavy duty equipment. Ordering and stocking or specifying are simplified when you buy from one source.**

Murray

**MURRAY MANUFACTURING CORPORATION**

**1250 Atlantic Ave., Brooklyn 16, N. Y.**

**Service Entrance & Meter Equipment • Magnetic Circuit Breakers • Switches • Current Limiting Reactors • Crow's-nest Aerial Ladders.**

## WANT MORE INFORMATION?

Check below the literature you need.

MAIL THE COUPON NOW.

Dept. E. W., Murray Manufacturing Co., Inc.
1250 Atlantic Avenue, Brooklyn, New York

Please send me the catalog page and any other literature on the items listed below.

1. Outdoor Meter Socket ..... ☐
2. Outdoor Weatherproof—Raintight Socket ..... ☐
3. Heavy Duty Meter Mounting Device ..... ☐
4. Outdoor Socket Meter Troughs
   - Vertical ..... ☐
   - Horizontal ..... ☐
5. Modified Outdoor Socket Meter Trough .. ☐
6. Indoor Socket Meter Trough ..... ☐
7. Combination Meter Socket and Service Control Equipment ..... ☐

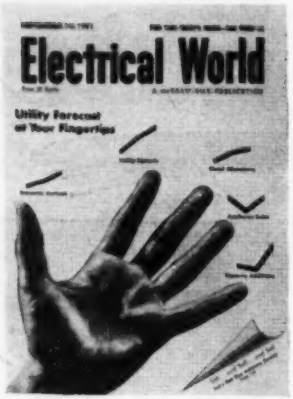
Name _____

Address _____

City _____

Firm _____

Title _____




## All Eyes on 1953

Today the electrical industry has its sights set on 1953. To readers seeking insight into what lies ahead this issue offers a double barreled diet.

**In The Forecast Section** the editors have sought to supply budget makers with the basic economic information they need to compile their figures for 1953. The sections on metal availability next year and on the probable equipment delivery situation are particularly appropriate due to radical changes that have been brought about, in both, by the effect of this summer's steel strike, and by the slowing up of the nation's mobilization effort.

**Looking ahead** to the day when the urgency of defense production lessens, production of consumer goods must rise to new high levels and stay there. But it won't stay long unless those goods are sold.

To the electrical industry this means that its products must be moved into the hands of users in the home, on the farm, in manufacturing, and in trade and commerce.

Appreciating this, Electrical World starts in this issue a program of articles under the slogan, "Sell . . . and Sell . . . and Sell." The first article is by James H. Jewell, Westinghouse sales head. It states the situation from the viewpoint of the electrical manufacturer. In following issues the interests of the utility, distributor, retailer, and contractor will be expressed. For the manufacturer's appraisal of the situation turn your attention to page 118.

# Electrical World

Published for 78 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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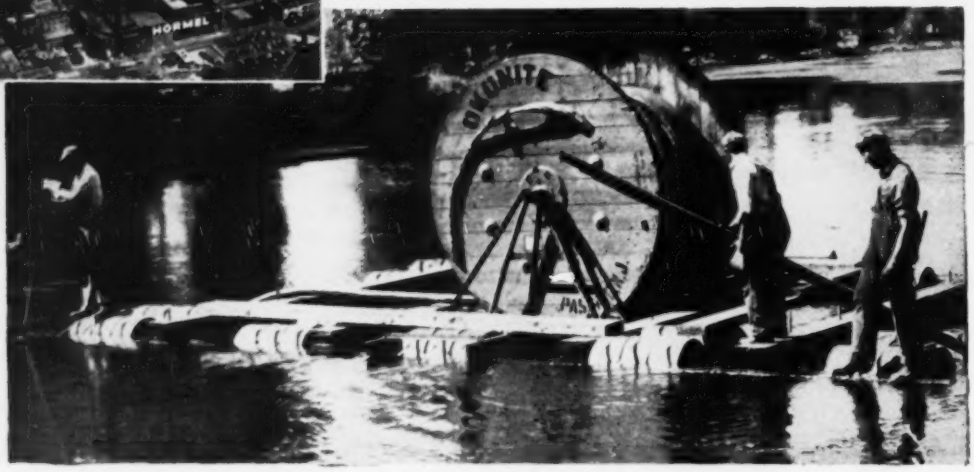
# HORMEL *Makes Sure*




# ...with OKOLITE cables

## Costly perishables depend on uninterrupted power transmission

At Hormel's plant in Austin, Minn.—home of famous "SPAM"—thousands of dollars worth of meat are constantly being processed. Any breakdown or stoppage of electrical service would cause a tremendous loss.

When Hormel enlarged its electrical requirements, engineers installed two 13.8 kv Okolite submarine cables to convey power from the municipal plant across the Red Cedar River to the Hormel switchboard. Cables were laid from a raft specially constructed to clear obstructions in the river.

Here are some of the reasons why Okolite-insulated cable was chosen for this important installation:

Long-lived, electrically-strong Okolite insulation resists corona cutting, heat and moisture, requires no lead sheath, even when totally submerged. Okolite has an outstanding record in submarine cable service for voltages up to 35,000 volts.

All Okolite-insulated cables, whatever their end use, are subjected to super-voltage a-c and d-c tests considerably in excess of industry specifications.

On any installation where uninterrupted service is imperative, Okonite is your best cable buy—to be sure. The Okonite Company, Passaic, N. J.

*THE BEST CABLE IS YOUR BEST POLICY*

**OKONITE** OKONITE SINCE 1878 ***insulated wires and cables***

# THE RIGHT TOOLS—
## right when they're needed

For prompt, efficient completion of any line job, make sure your linemen have the right tools—*right* when they're needed.

And, for the easiest way to obtain this equipment, make it a point to order from Graybar. On a single transaction, you can get pliers, wrenches, shovels, and all the other tools you need for line construction and maintenance . . . safety equipment for hot-line repairs . . . even trailers and splicing carts.

By ordering through Graybar, you save the time and expense of multiple inquiries. You get products that are dependable and give long service-life—products that have been tested and accepted by linemen throughout the nation.

Your local Graybar Representative is a convenient source of information on all of the other materials required for utility pole-line projects. You'll find him well-informed on both availability and usage of the more than 100,000 electrical items distributed by Graybar.

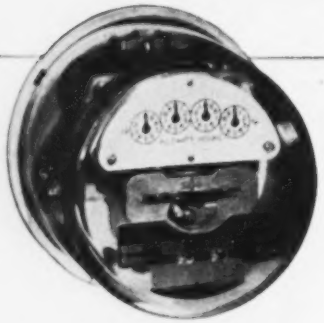
Remember, too, that for special help on difficult problems, an experienced Graybar Outside Construction Specialist is at your service.

Graybar offices and warehouses are strategically located in over 100 cities—a feature that enables us to give you efficient local service on day-to-day orders and often saves valuable time in emergencies. *Graybar Electric Company, Inc. Executive offices: Graybar Building, New York 17, N. Y.*

*You get the best of everything electrical*
*Via* GraybaR

IN OVER 100
PRINCIPAL CITIES

# What would YOU like to know about metering?

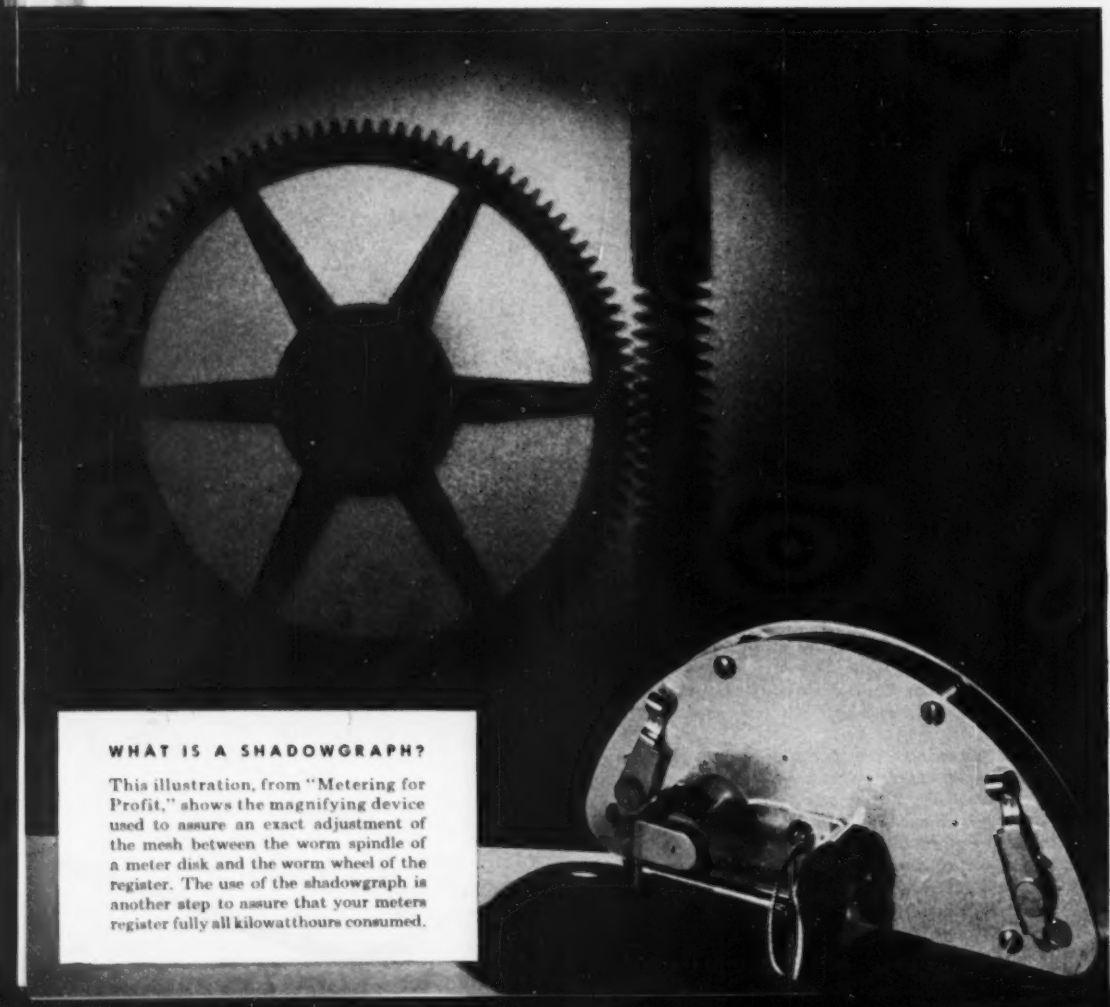


Meters are important to everybody in the Electric Utility Industry — not only because they are the operating components through which every cent of revenue is measured — but, because modern meters can help the industry obtain the maximum benefits in Metering for Profit.

Would you like to know how modern meters can promote good public relations?

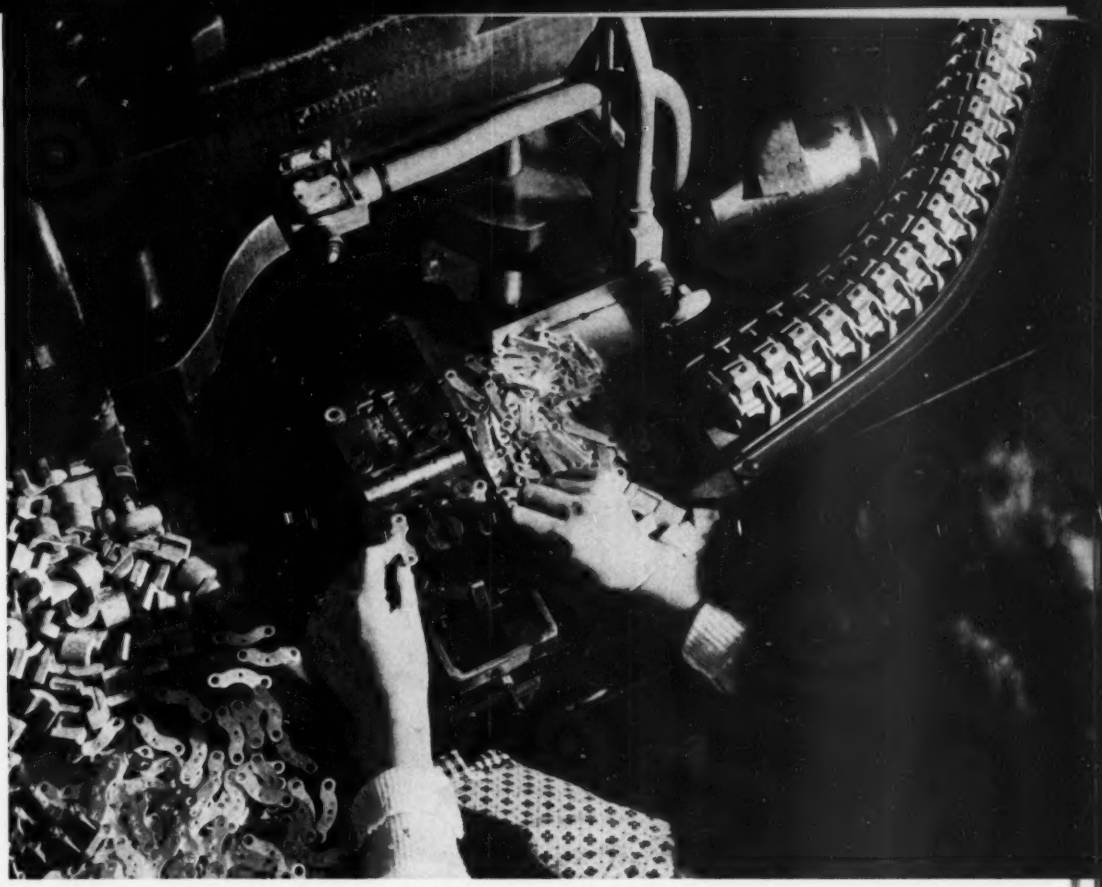
Would you like to know how accurate meters facilitate fair pricing? How dependable meters can reduce operating costs? And, how well-designed meters save operating and maintenance expense for your company?

If you are interested in the answers to these, and many other questions, get your copy of "Metering for Profit". It's yours for the asking.



**WHAT IS A SHADOWGRAPH?**

This illustration, from "Metering for Profit," shows the magnifying device used to assure an exact adjustment of the mesh between the worm spindle of a meter disk and the worm wheel of the register. The use of the shadowgraph is another step to assure that your meters register fully all kilowatthours consumed.



**HOW DO PERMANENT MAGNETS REDUCE HIGH BILL COMPLAINTS?**

Damping magnets control the speed of the meter. Accuracy depends on the permanence of their strength. Millions of meters equipped with Alnico magnets have been in operation for years without a report of a single one of them speeding up in service due to loss of damping strength.

*Write for*

## "METERING FOR PROFIT"

A non-technical report to utility company personnel concerning watthour meters. If you are interested in metering and its effect on profits, it should be "must reading". The coupon will assure you of a copy.

SANGAMO

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

**SANGAMO ELECTRIC COMPANY, Springfield, Illinois**

**Please send me my free copy of "Metering for Profit"**

Your Name_____

Title_____

Company_____

City and Zone_____ State_____

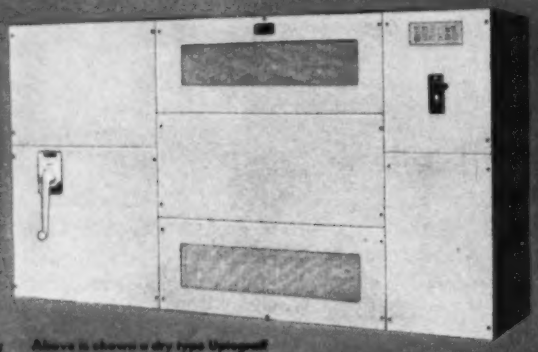
SM52-1

# For Unit Substations

# Uptegraff Dry Type Transformers

## Complete with enclosure

Uptegraff Dry Type Transformers for Unit Substations are furnished in standardized sizes and ratings from 112.5 KVA to 2000 KVA, 5 to 15 KV inclusive. They are furnished with sturdy, well-ventilated steel enclosure if complete unit is desired. Terminals can be top or side mounted.



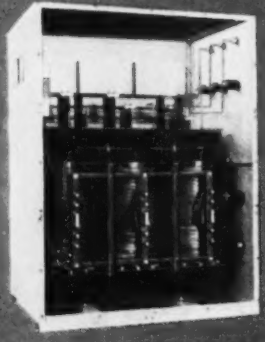
## Core and Coil Assembly only

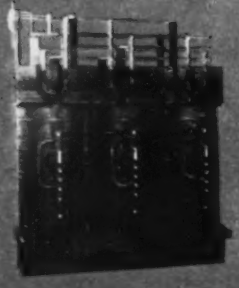
For building into a complete substation enclosure, Uptegraff furnishes dry type the core and coil assembly alone, with rigid clamping frame and sturdy terminal construction. All Uptegraff dry type transformers are designed and built for dependable service. They are mechanically strong and electrically efficient.

Above is shown a dry type Uptegraff substation power transformer. Fully protected by steel enclosure, yet ample provision for ventilation.

Right—Substation transformer with front cover removed, showing H. V. Terminal arrangement.

Below—Uptegraff Core and Coil assembly for installation in unit substation.





R. E. Uptegraff Manufacturing Co.

*Scottdale, Pa.*

# Teamwork is Necessary for Sustained Gains!

## A Solution to the Residential Revenue Question

Just as the need for electric refrigeration was established through the cooperative efforts of the electric utilities and appliance manufacturers, so will today's low-saturation appliances take their places alongside the refrigerator in America's homes.

As the demand grows for today's specialty appliances, the solution to the residential revenue question becomes evident. Added revenue will come from the wider use of Dishwashers—Disposalls ®—Freezers—Automatic Dryers—Ironers—Automatic Washers—as well as from Electric Ranges and Water Heaters. Teamwork between utilities and manufacturers can turn the trick.

Hotpoint, with its tradition of close cooperation and understanding of utility problems has taken the lead in the promotion of all-electric living. Promotion emphasis has been put on all-electric kitchens and home laundries—not on just one or two appliances. Acceptance is being built for the complete line of electrical servants.

And now, to aid in developing a better balanced, more profitable domestic electrical load, we have available for you new studies on "Balanced Revenue Through Selective Selling" and "Consumer Survey Plans for Retail Salesmen." You can get full information on these studies by writing the Utility Division, Hotpoint Co.

Hotpoint Co.

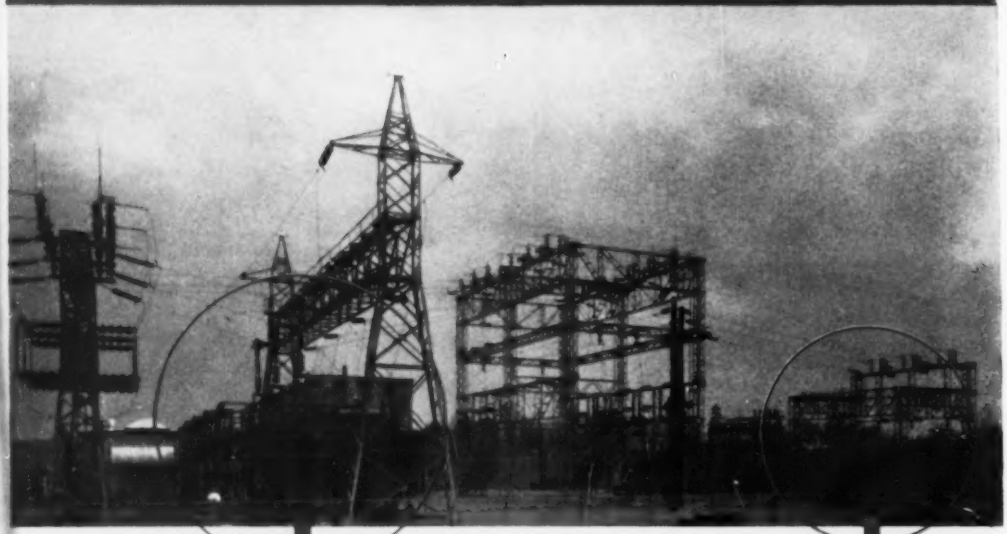
*(A Division of General Electric Company)*

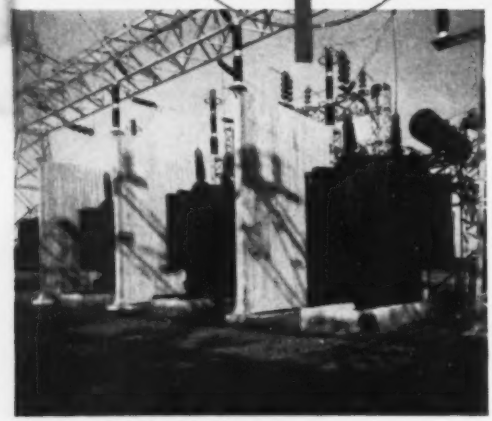
***5600 West Taylor Street, Chicago 44, Illinois***

# *Pennsylvania*

## an important component of many

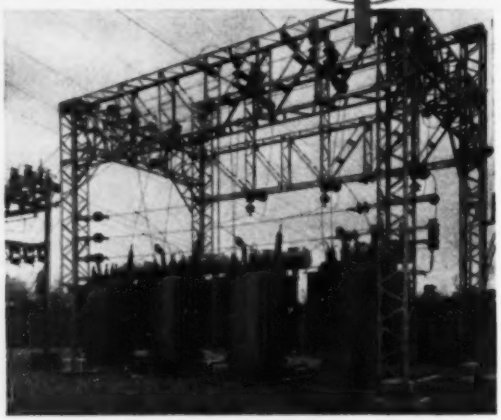
**ALTAVISTA SUBSTATION** Virginia Electric & Power Company





**TRANSFORMER COMPONENT**

Four 13,333 Kva Pennsylvania Auto Transformers.
Single Phase, 60 Cycles, 55°C. Rise.
Voltage: 79680/138000Y-49840/69000Y.
13200Δ volts.



**TRANSFORMER COMPONENT**

Four 2,000 Kva Pennsylvania Transformers.
Single Phase, 60 Cycles, 55°C. Rise.
Voltage: 38100/66000Y-7960/13800Y-
2400/4160Y volts.

# TRANSFORMERS . . .
# "Selected" Outdoor Substations

**There is only one positive way of combining the finest equipment into an outdoor substation, and that is by careful selection of all component parts.**

**Only by carefully selecting transformers, switchgear, breakers, etc., can the engineers of an Electric Utility be sure that all items of the station will meet the prescribed mechanical and electrical requirements. And *only* by selective ordering can the Utility get what it actually *wants* and *needs*.**

**Pennsylvania transformers are an important component in many outstanding outdoor substations. The Midway Station of the Cincinnati Gas & Electric Company and the Altavista Transmission Substation of Virginia Electric Light and Power Company are examples of two modern stations in which the component transformers were supplied by Pennsylvania Transformer Company.**

•

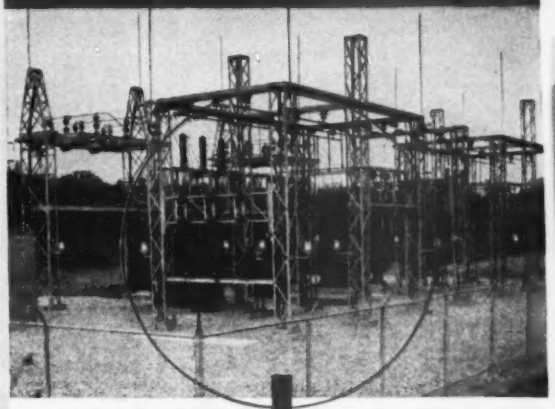
***Pennsylvania Power Transformers are available in sizes up to 100,000 Kva, and voltages up to 230 Kv. Transformers with ratings of 60,000, 70,000, and 100,000 Kva are now under construction in the Pennsylvania plant.***

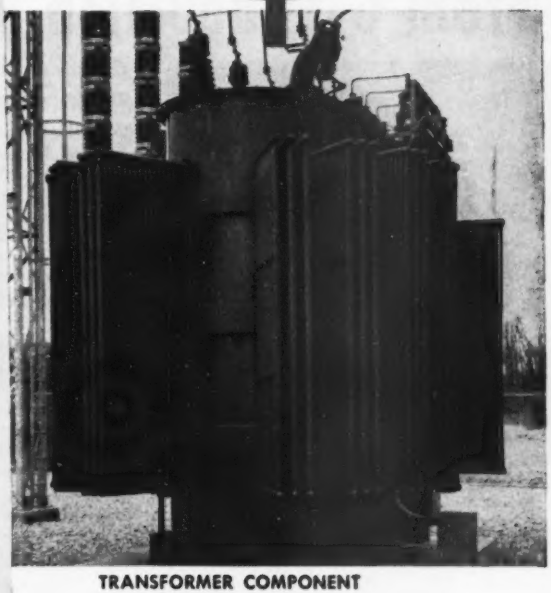
**NOTICE TO ELECTRIC UTILITIES**

**You are invited to inspect the plant and facilities of Pennsylvania Transformer Company. Arrangements can be made through a Pennsylvania sales representative, or by contacting Pennsylvania's Sales Department, 529 Adams Avenue, Canonsburg, Pa.**

***Pennsylvania***
**TRANSFORMER COMPANY**
**CANONSBURG, PENNA.**
***Greater Pittsburgh District***

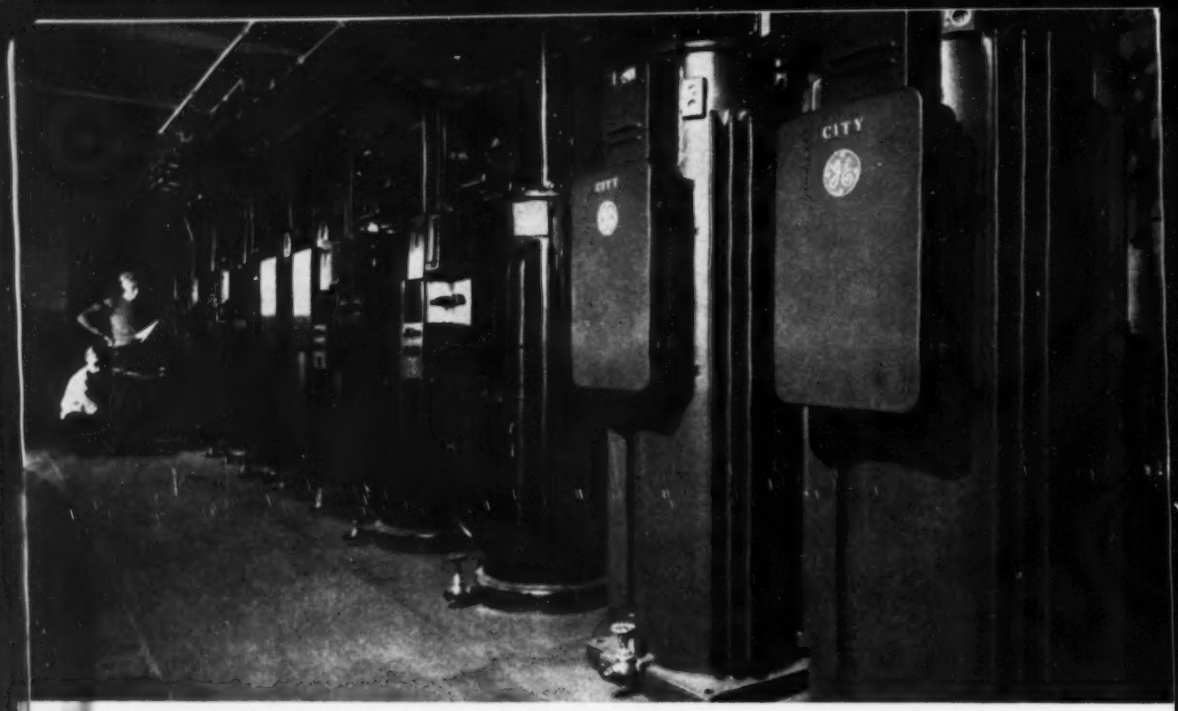
**MIDWAY SUBSTATION**





**TRANSFORMER COMPONENT**

Two 20,000 Kva Pennsylvania Transformers.
3 Phase, 60 Cycles, 55°C. Rise.
Voltage: 66000-33,000Y volts.




**Highest quality regulation** provided by 12 IRS regulators of Western Mass. Elec. Co. maintains consumer goodwill. Passing years have brought important design improvements, but even oldest units continue to provide accurate stepless regulation.

# Utility Gets 21 Years of Top-notch Service From G-E Induction Voltage Regulators

**Outstanding Over-all Performance.** J. L. (Joe) Hyland, Supervisor of Stations, Northern Division, is thoroughly pleased with the ease of adjustment and low maintenance of IRS regulators.

## Consumers get faster, closer voltage correction . . . utility reaps added benefits of reduced maintenance

J. L. (Joe) Hyland, Supervisor of Stations, Northern Division of the Western Massachusetts Electric Company, reports that the Company installed its first four G-E Type IRS single-phase induction voltage regulators at its Greenfield Substation back in 1931.

**Their over-all performance** and ease of adjustment so impressed company officials that they have added only G-E induction regulators at the substation since. Twelve have been installed to date—and they have been in operation almost continuously.

**Protect consumer goodwill.** The ability of these regulators to respond immediately to voltage changes and the resulting close regulation assure the type of service that protects valuable consumer goodwill.

**They require less maintenance.** Because of the rugged simplicity of the IRS design, these regulators have needed little maintenance. There are only three moving parts, which are mounted on enduring roller or ball bearings and coupled through double worm gearing. On the units built since 1940, no lubrication is necessary because the complete mechanism (including the motor) is immersed in oil.

For more information on the performance of IRS regulators, ask your G-E Apparatus Sales representative for Bulletin GEA-2985. Or write *General Electric Company, Schenectady 5, New York.* 454-94

GENERAL ELECTRIC

# YOUR SELF-SUPPORTING AERIAL CABLES

WILL

✓ Operate Better

✓ Last Longer

✓ Cost Less to Maintain

WITH Copperweld

## NEUTRAL-MESSENGERS

Your aerial cables are often subjected to the weight of ice and wind loads—the heat of the sun—cold and moisture from rain and snow. To withstand this punishment by the elements, and to protect your investment in aerial cables, use Copperweld* Neutral-Messengers and secure improved operation, longer life, lower maintenance.

With Copperweld, you get a neutral-messenger that's engineered to give you the electrical conductivity required for the return current—an important factor in the efficient operation of aerial cables. And, because Copperweld Messenger is non-rusting, no replacement is necessary for the life of the aerial cable installation. This results in reduced maintenance expense.

Another reason for Copperweld's wide usage is the fact that its permanent strength assures greater safety for long spans without excessive sags. Heavy ice and wind loads are no problems.

When ordering self-supporting aerial cables from your suppliers, be sure to insist that they include Copperweld Neutral-Messengers. They're made in many sizes and types to meet various combinations of strength and conductance. Engineering data will be mailed on request. Write us today.

*Trade Mark

**COPPERWELD STEEL COMPANY** *Glassport, Pa.*

SALES OFFICES IN PRINCIPAL CITIES

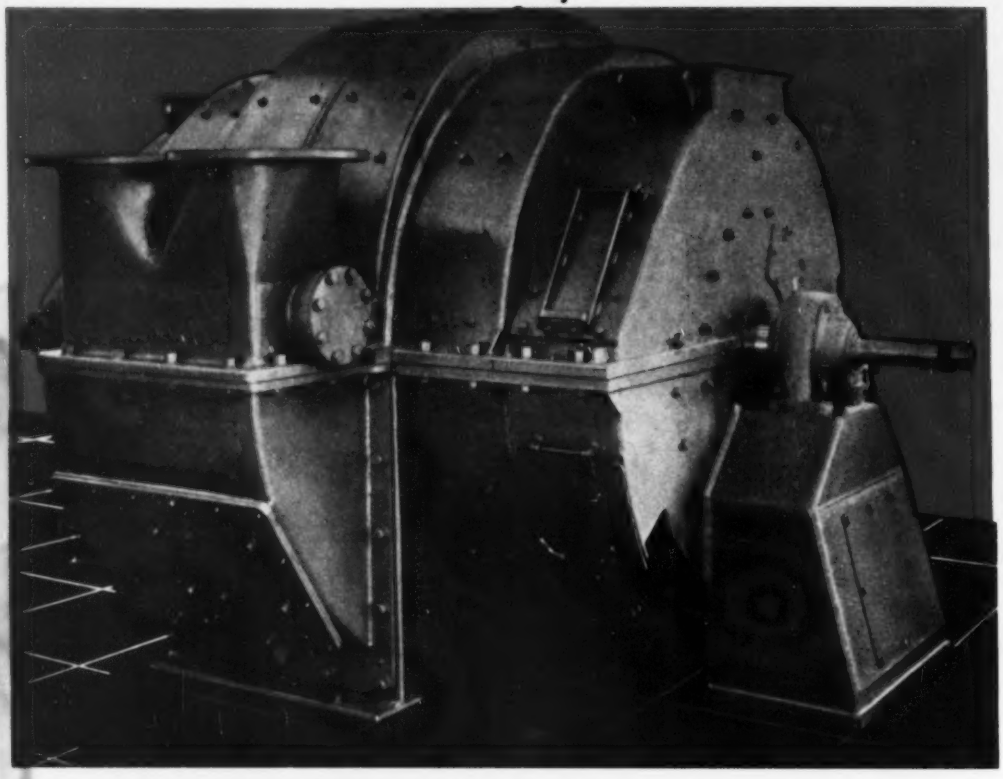
Copperweld TRADE MARK

HIGH-STRENGTH, NON-RUSTING

**NEUTRAL-MESSENGERS**

*For Self-Supporting Cables*

# Performance of Riley "50" Pulverizers



Riley "50" Pulverizers give you all these other significant advantages . . .

- Quiet vibrationless operation
- Flexibility—wide load range
- Ability to carry extremely low loads
- Low power consumption
- Ease of regulation
- Small space required
- Minimum foundation cost
- Parts easily renewed
- Can be operated without coal feed
- Ease of ignition
- Low lubrication cost
- No worms or gears—Just two bearings
- High primary air temperatures
- Low maintenance

The Riley "50" Pulverizer is the latest development in the coal pulverizing field. It is the only pulverizer using tungsten carbide parts to assure long periods of continuous operation and low maintenance. It will pay you to investigate Riley "50" Pulverizers when considering this type of equipment.

TRADE MARK Rx REGISTERED

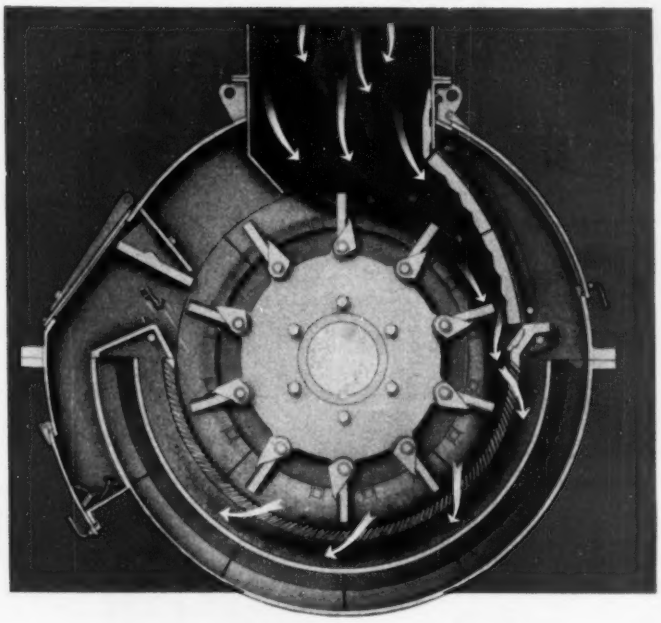
# RILEY

**STOKER CORPORATION, WORCESTER, MASS.**

Boston · New York · Philadelphia · Washington · Buffalo · Pittsburgh · Cleveland · Detroit · Chicago
Cincinnati · Charlotte · Atlanta · New Orleans · St. Louis · Kansas City · St. Paul · Tulsa · Houston
Denver · Salt Lake City · Los Angeles · Portland · Seattle

BOILERS · PULVERIZERS · BURNERS · STOKERS · SUPERHEATERS · ECONOMIZERS

# not affected by Increase in Moisture



## This Crusher-Dryer Stage Does the Trick

Both field and laboratory tests have conclusively proven that moisture content of coal does not affect performance of Riley "50" Pulverizers and that capacity is not decreased with an increase in moisture provided primary air temperatures are adequate. Coals with free moisture up to 15%, which is about the free moisture limit that coal can retain, have been satisfactorily pulverized.

The ability of Riley "50" Pulverizers to handle such high moisture coals without capacity reduction is due to the performance of the crusher-dryer section of the Riley "50" Pulverizer. In this first stage, the free moisture is evaporated and the coal crushed to a fine granular state so that coal passing to final pulverizing stage is free of surface moisture.

Ask users of Riley "50" Pulverizers—they will tell you that moisture of coal means nothing to their Riley "50" Pulverizers.

**All of these people have ordered Riley "50" Pulverizers within the past two years.**

PUBLIC UTILITIES
- Detroit Edison Co.
- Iowa-Illinois Gas & Electric Co.
- Monongahela Power Co.
- Utah Power & Light Co.
- Hartford Electric Light Co.
- Public Service Co. of Colorado
- Iowa Electric Light & Power Co.
- Northern States Power Co.
- The Potomac Edison Co.
- Superior Water, Light & Power Co.
- Western Colorado Power Co.
- South Carolina Public Service Authority
- Corn Belt Power Cooperative
- Central Ohio Light & Power Co.

MUNICIPAL PLANTS
- City of Richmond, Indiana
- City of Holyoke, Mass.
- City of Rochester, Minn.
- City of Owensboro, Ky.
- City of Austin, Minn.

INDUSTRIAL COMPANIES
- Carbide & Carbon Chemical Co.
- Goodyear Tire & Rubber Co.
- Western Electric Co.
- General Electric Co.
- Hooker Electrochemical Co.
- North American Aviation
- The Ohio Oil Co.
- National Supply Co.
- Continental Can Co.
- Monsanto Chemical Co.
- St. Croix Paper Co.
- Celanese Corp. of America
- Owens-Corning Fiberglas Co.
- Pittsburgh Plate Glass Co.
- Lawless Bros. Paper Co.
- U. S. Finishing Co.
- Bell Aircraft Co.
- Syracuse University
- U. S. Steel Company
- Riegel Textile Corp.
- White Pine Copper Co.
- Ciba States Ltd.
- Great Lakes Naval Training Station
- Boston Navy Yard
- Ashland Oil & Refining Co.
- Ruberoid Co.

ENGINEERED BY THE FOLLOWING CONSULTANTS
- Stone & Webster Engineering Corp.
- Ebasco Services
- Sargent & Lundy
- Ford, Bacon & Davis, Inc.
- Chas. T. Main, Inc.
- Sanderson & Porter
- United Engineers & Constructors
- Jackson & Moreland
- Bechtel Corporation
- Pioneer Service & Engineering Co.
- Black & Veatch
- Stanley Engineering Co.
- Douglas M. McBean
- Robson & Worse, Inc.
- Francisco & Jacobs
- Burns & McDonald
- Kenneth R. Warrington
- J. V. Edeskuty
- Robert S. Curl & Associates
- Interboro Company
- Catalytic Construction Co.

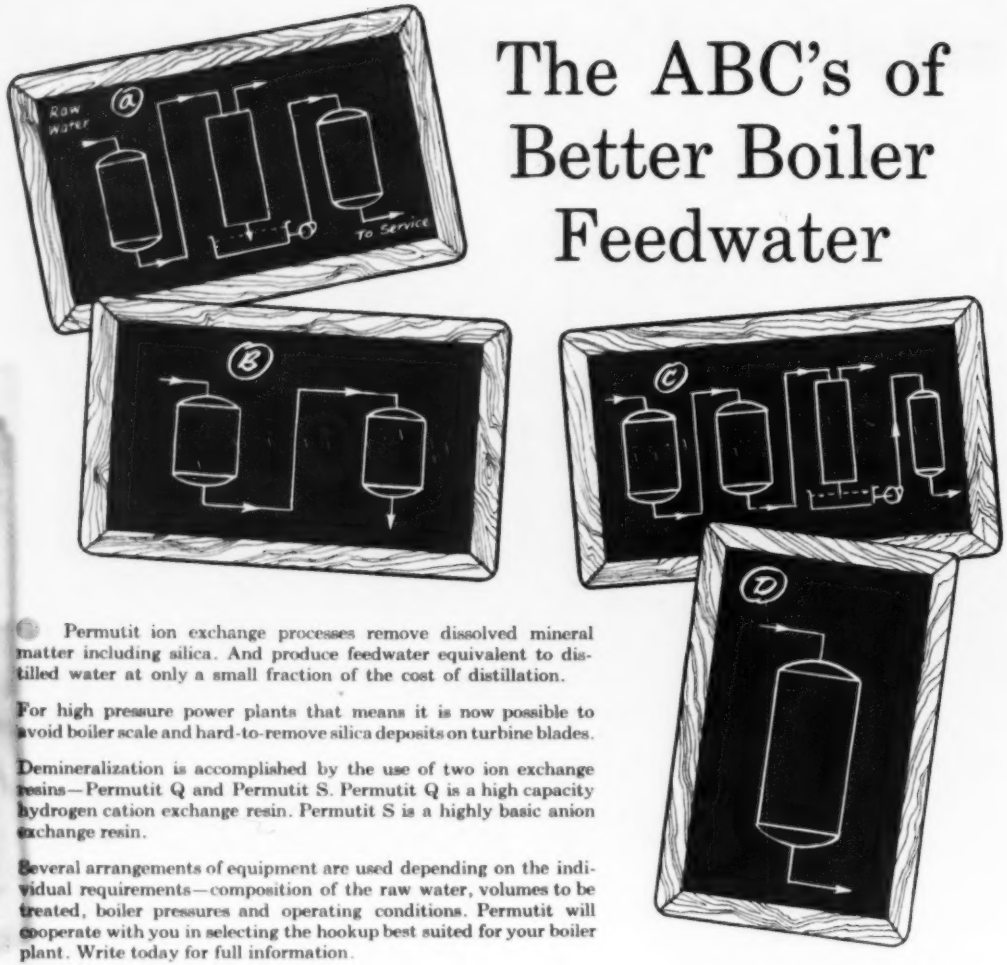
*A survey of your Power Plant by a consulting engineer will possibly show ways of making surprisingly large savings in your power costs*

# COMPLETE STEAM GENERATING UNITS

. . . it will pay you to visit modern Riley Installations before purchasing Boiler or Fuel Burning Equipment

WATER-COOLED FURNACES • STEEL-CLAD INSULATED SETTINGS • AIR HEATERS

# The ABC's of Better Boiler Feedwater




Permutit ion exchange processes remove dissolved mineral matter including silica. And produce feedwater equivalent to distilled water at only a small fraction of the cost of distillation.

For high pressure power plants that means it is now possible to avoid boiler scale and hard-to-remove silica deposits on turbine blades.

Demineralization is accomplished by the use of two ion exchange resins—Permutit Q and Permutit S. Permutit Q is a high capacity hydrogen cation exchange resin. Permutit S is a highly basic anion exchange resin.

Several arrangements of equipment are used depending on the individual requirements—composition of the raw water, volumes to be treated, boiler pressures and operating conditions. Permutit will cooperate with you in selecting the hookup best suited for your boiler plant. Write today for full information.

**A TWO STEP WITH DEGASIFIER:** In large demineralizing plants, a degasifier is usually included as an inexpensive means for removing carbon dioxide.

**B TWO STEP WITHOUT DEGASIFIER:** No repumping required. Used where total quantities are not very great or with waters of low bicarbonate content.

**C THREE STEP WITH DEGASIFIER:** Extremely economical and effective arrangement for waters containing relatively high amounts of sulfates and chlorides.

**D MIXED BED:** An extremely compact arrangement. Both cation and anion exchangers are in the same unit. Used alone or as a final step.

*The equipment described is also furnished in multiunit arrangements to treat whatever quantities of water are required and to meet all operating conditions.*

**PERMUTIT**®

***The sole manufacturer of all types of cation and anion exchangers and equipment.***
***THE PERMUTIT COMPANY, Dept. EW-9,***
***330 West 42nd Street, New York 36, N. Y.***

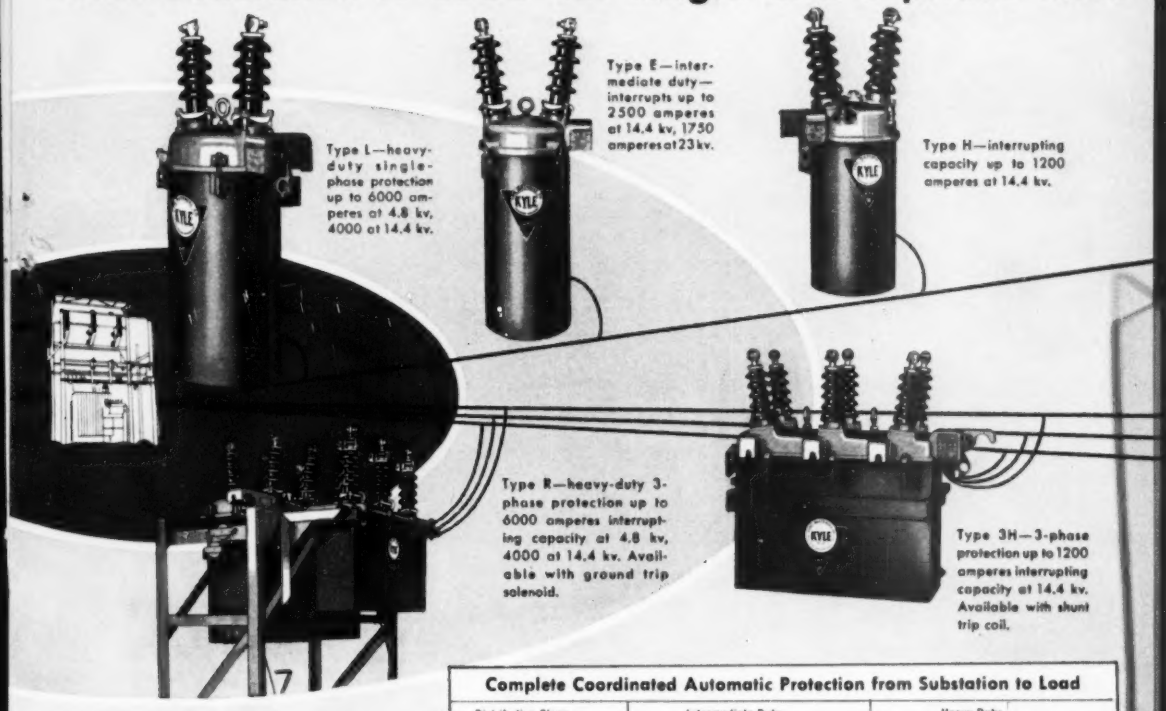
***Permutit Company of Canada, Ltd.,***
***6975 Jeanne Mance Street, Montreal.***

**ION EXCHANGE AND WATER CONDITIONING HEADQUARTERS**

# L-M now offers

# Complete Automatic Recloser Protection

## from Substation to Load—for single and 3-phase lines




Type L—heavy-duty single-phase protection up to 6000 amperes at 4.8 kv, 4000 at 14.4 kv.

Type E—intermediate duty—interrupts up to 2500 amperes at 14.4 kv, 1750 amperes at 23 kv.

Type H—interrupting capacity up to 1200 amperes at 14.4 kv.

Type R—heavy-duty 3-phase protection up to 6000 amperes interrupting capacity at 4.8 kv, 4000 at 14.4 kv. Available with ground trip solenoid.

Type 3H—3-phase protection up to 1200 amperes interrupting capacity at 14.4 kv. Available with shunt trip coil.

### New Kyle heavy-duty Type R 3-phase recloser makes L-M first to offer a complete, coordinated line

As shown in the illustration, L-M now provides complete automatic protection from substation to user, in both single-phase and 3-phase recloser units.

The new Kyle Type R provides up to 100,000 kva interrupting capacity—up to 6000 amperes—ample for a good-sized substation or for heavily loaded feeders with high fault currents. The Kyle Type 3H completes the 3-phase line with up to 1200 amperes interrupting capacity.

In single-phase, the Kyle Type L provides up to 6000 amperes, for substation or heavily loaded feeders; the Type E covers the range from 1200 to 2500 amperes, and the Type H provides single-phase protection up to 1200 amperes.

Ask the L-M Field Engineer for information and bulletins on the complete Kyle line; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

**Complete Coordinated Automatic Protection from Substation to Load**

| Distribution Class Nominal Voltage Rating 14.4 kv BIL 95 kv | | | Intermediate Duty Nominal Voltage Ratings 23 kv BIL 150 kv | | | | Heavy Duty Nominal Voltage Ratings 14.4 kv BIL 110 kv | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Single-Phase Type H Three-Phase Type 3H | | | Single-Phase only Type E | | | | Single-Phase Type L Three-Phase Type R | | | |
| Rating Amps. | Min. Trip | Inter. Rating* 14.4 kv | Rating Amps. | Min. Trip | Inter. Ratings* 14.4 kv | 23 kv | Rating Amps. | Min. Trip | Inter. Ratings* 4.8 kv | 14.4 kv |
| 5 | 10 | 150 | 5 | 10 | 200 | 125 | .... | ... | .... | .... |
| 10 | 20 | 250 | 10 | 20 | 400 | 250 | .... | ... | .... | .... |
| 15 | 30 | 375 | 15 | 30 | 600 | 375 | .... | ... | .... | .... |
| 25 | 50 | 600 | 25 | 50 | 1000 | 625 | 25 | 50 | 1500 | 1500 |
| 35 | 70 | 840 | 35 | 70 | 1400 | 875 | 35 | 70 | 2100 | 2100 |
| 50 | 100 | 1200 | 50 | 100 | 2000 | 1250 | 50 | 100 | 3000 | 3000 |
| | | | 70 | 140 | 2500 | 1750 | 70 | 140 | 4200 | 4000 |
| | | | 100 | 200 | 2500 | 1750 | 100 | 200 | 6000 | 4000 |
| | | | | | | | 140 | 280 | 6000 | 4000 |
| | | | | | | | 160# | 320 | 6000 | 4000 |
| | | | | | | | 185# | 370 | 6000 | 4000 |
| | | | | | | | 200** | 400 | 6000 | 4000 |
| | | | | | | | 225# | 450 | 6000 | 4000 |
| | | | | | | | 280# | 560 | 6000 | 4000 |

*Recloser interrupting ratings are based on the maximum test circuit X–R ratio of not less than 8 and the asymmetrical rating in total RMS amperes is 1.4 times the symmetrical ratings given in the table.
#Available in three-phase Type R only. **Available in single-phase Type L only.

**For Ground Fault Tripping:** Type R heavy-duty 3-phase recloser is available with built-in ground trip solenoid and auxiliary current transformer. Type 3H is available with a shunt trip coil which may be used for ground fault tripping with suitable auxiliary equipment.

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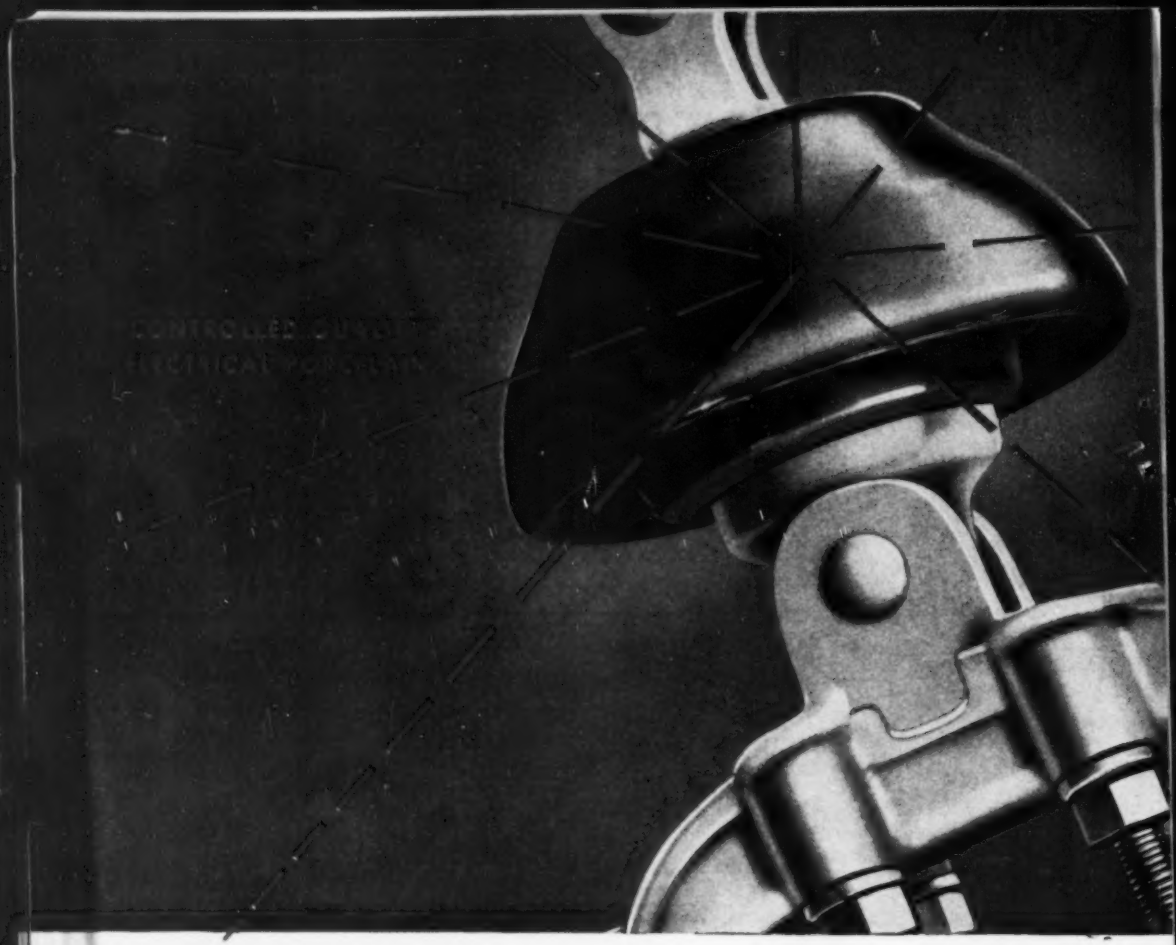
# LINE MATERIAL Kyle® Reclosers

COMPLETE COORDINATED AUTOMATIC PROTECTION FROM SUBSTATION TO LOAD



# Shoots J-D "Bronco" Insulator 49 Times—No Failure!

by **W. V. SWAN**, Manager, Porcelain Sales, Line Material Company

L-M's J-D "Bronco" is a big, rugged insulator with a heavier and stronger porcelain body than the conventional suspension insulator. Therefore it is more resistant to breakage caused by rough handling or amateur sharpshooters.

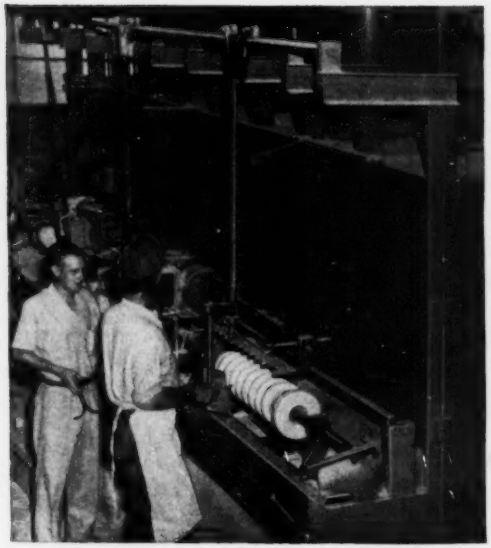
The gun-fire test was made to determine whether a standard "Bronco" insulator would flash over or pull apart while under gun fire. A regular production sample was suspended from an insulated post, under load. A hot 20,000-volt line was connected to the top terminal, and the bottom terminal was grounded.

From a distance of 15 feet, 22-calibre long rifle shells were fired directly at the insulator. After 49 shots, the insulator had not flashed over or pulled apart; and there was no appreciable damage, as shown in the photograph at the right. The insulator was then tested. It still had its original mechanical strength of 10,000 pounds. Dry flashover had dropped only from 60,000 to 45,000 volts, still high enough to carry its normal line voltage.

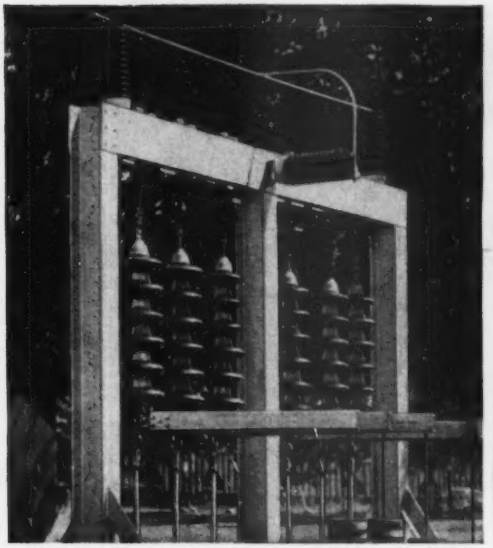
Seldom does any insulator have to take this sort of test. Yet the fact that the "Bronco" could take it shows its exceptional ruggedness. That is why one major utility company standardizes on the J-D "Bronco."

### "Controlled Quality" Produces Better Insulators

At the J-D plant, quality is closely controlled through inspection of raw materials, constant check on production processes, and thorough inspection and testing of finished goods.



Quality is carefully controlled and checked, all through the production process. Before firing, molded and dried porcelain is carefully machined or trimmed to the required size and shape. At the same time it is inspected, and any imperfect specimens are eliminated.



One of several mechanical and electrical tests of J-D strain insulators. All strain insulators are given the "M&E" test as a regular part of the production schedule, and a certain number of each batch are put through a rigid complete destruction test.

J-D has made many contributions to quality control in electrical porcelain. The tunnel kiln is a J-D development. This kiln consists of a tunnel about 200 feet long, in which firing temperatures can be closely controlled. Cars of porcelain move slowly through this kiln, at controlled speeds, with closely controlled temperatures. Firing is so even that internal stresses are almost completely eliminated. This is one reason for the ruggedness shown by J-D insulators.

Another J-D contribution is the fuchine dye test. This is a method for determining the porosity of the porcelain—which in turn determines the strength and insulating value of electrical porcelain. In this test, unglazed porcelain fragments are dipped into the dye under controlled time and pressure. Then a section is broken from the specimen. Any penetration of the dye indicates a porous structure, which is weak. If the dye does not penetrate, the structure is dense, and strong.

SHOT 49 TIMES—and this is all the damage caused by 22-cal. long rifle cartridges! The insulator still has its original mechanical strength, and dry flashover dropped only from 60,000 to 45,000 volts, still ample to carry the load.

### First Porcelain-Housed Cutout

J-D was the first to make a wet-process fuse cutout box, originated in 1926 by Line Material. Prior to that time, cutouts had been housed in wooden "birdhouses." L-M conceived the idea of a porcelain housing, which would provide greater protection and better insulation, and went to J-D with the problem. Today the porcelain housing is, of course, standard in the industry.

### Complete Line of Porcelain and Hardware

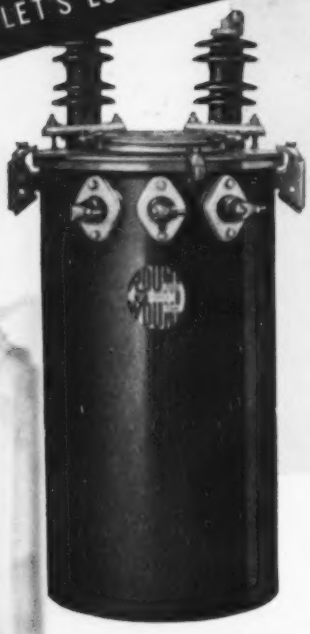
L-M offers a complete line of J-D insulators, fittings, and hardware. These products amply meet all EEI and NEMA standard specifications. *Every insulator* is given a tensile strength test and flashover test, in addition to other regular inspections. For complete information about L-M's line of J-D products, ask the L-M Field Engineer, or write Mr. Swan at Line Material Company, Jeffery-DeWitt plant, Kenova, W. Virginia (a McGraw Electric Company Division). 93

**LINE MATERIAL**

*Electrical Porcelain Insulators*

LM J-D

LET'S LOOK AT THE FACTS



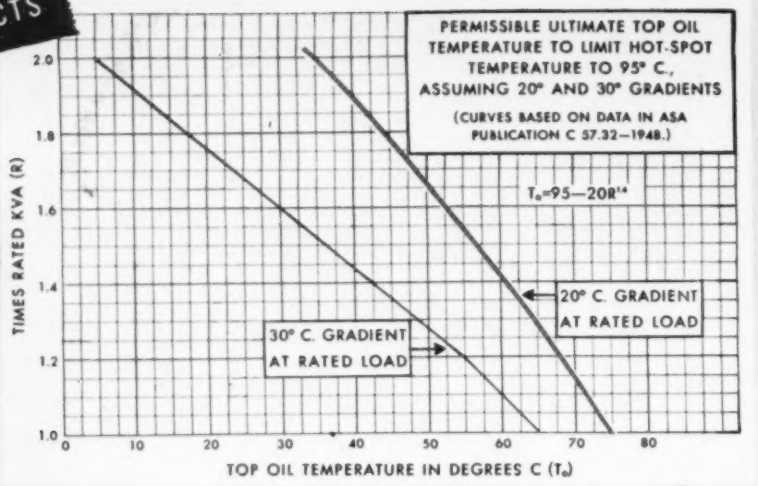



FIGURE 1.—The colored line represents the conservative performance typical of a core-type transformer with highly efficient cooling such as the L-M Round-Wound, while the black curve represents the loading permissible with a transformer with less efficient cooling. These are ultimate oil temperatures. Because of efficient dissipation of heat from the coils to the oil, the oil reaches its ultimate temperature more rapidly in L-M Round-Wounds than in some other styles of construction.

# How L-M Round-Wound Design Permits Heavier Loading or Longer Transformer Life

**Round coils wound directly onto a wound core provide exceptional cooling that keeps copper and hot-spot temperatures relatively low even under high short-time overloads.**

by **ROBERT P. THOMPSON,**
Assistant Chief Engineer,
Transformer Division,
Line Material Company

Greater transformer utilization through heavier loading offers substantial savings on almost any power system. Therefore the subject of transformer loading is receiving exceptional attention, both from utility companies and from the manufacturers.

Overload capacity of any individual transformer depends upon such factors as ambient temperatures, previous condition of loading, duration of the overload, and the sacrifice in transformer life that the user is willing to make.

But the principal factor is the transformer itself. Since overload capacity is limited by hot-spot temperature rise during the overload period, this capacity is largely determined by the design of the coils and the efficiency with which heat can be dissipated to the oil.

Obviously a core-type transformer, which has greater coil surface exposure, offers better overload capacity than shell types, in which coil surfaces are blanketed by core steel.

Round coils offer greater overload capacity than rectangular coil types, because coils present more unobstructed surface to cooling oil.

The Round-Wound transformer combines the advantages of the core-type transformer with the rapid heat dissipation of unobstructed round coil surfaces—and offers, in addition, the advantages of the cruciform-cross-section core, which provides natural oil passages for cooling the inside of the coils. Thus in the Round-Wound transformer, heat is dissipated *more rapidly* and more uniformly. For this reason the Round-Wound design provides higher short-time overload capacity, or a longer life with the same overload (Figure 3).

### Get Details on L-M Round-Wound Transformers

Ask the L-M Field Engineer, or write Mr. Thompson at the Transformer Division, Line Material Company, Zanesville, Ohio (a McGraw Electric Company Division).

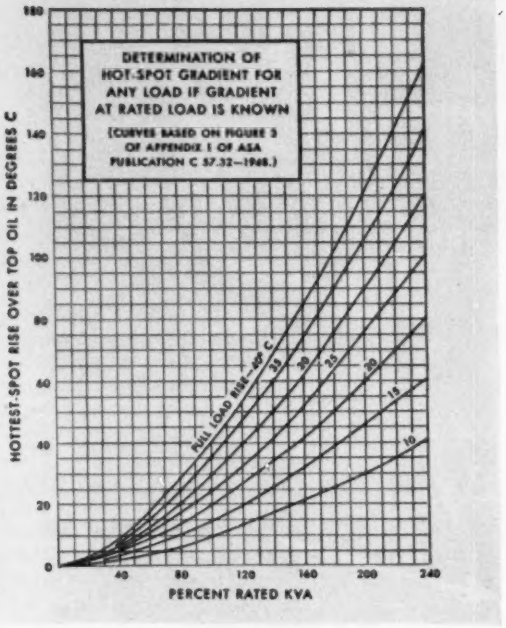



FIGURE 2—Here is presented a method of determining the hot-spot gradient for any load, if the gradient at rated load is known. It is to be noted that the higher the gradient at rated load, the more rapid is the rate of increase in the gradient with overload. The L-M Round-Wound transformer with a lower hot-spot gradient at rated load has a greater capacity for overload before damaging temperatures are reached.

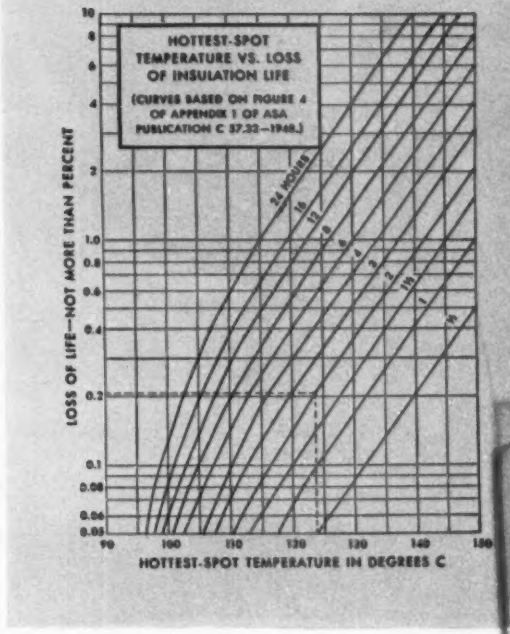



FIGURE 3—The primary factors in the deterioration of cellulosic insulation are time and temperature. Here is a method for approximating the loss of insulation life due to these two factors. Obviously an L-M Round-Wound transformer with its appreciably lower hot-spot temperatures during overloads will reduce the possible insulation damage and increase the overall life.

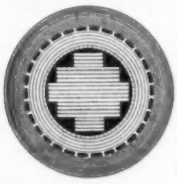


FIGURE 5—Cruciform cross section of the wound core provides oil passages between core and coils. In addition spacers between windings and between layers in larger sizes provide additional oil circulation, giving exceptionally good cooling for the entire unit.

## Some of the Outstanding Characteristics of L-M Round-Wound Transformers

**High Short-Time Overload Capacity**

**Better Regulation at all power factors**

**High Impulse Level, with ample creepage distances and generous insulation**

**High Short-Circuit Strength, because round coils have less tendency to distort**

**Low Exciting Current, because the core is not cut or disturbed after annealing**

**Better Loss Ratios with lower total losses**

**Filled with ORTO®, L-M's oxidation-resistant transformer oil, inhibited for longer life.**

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*"Round-Wound" is a Line Material Co. trademark.*

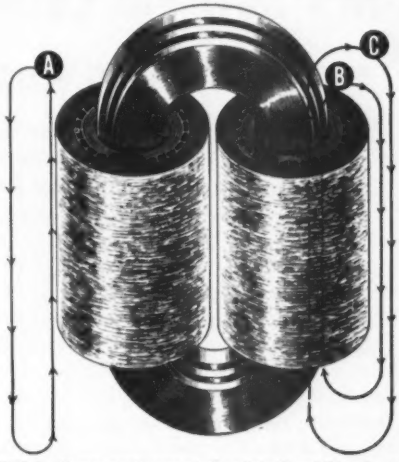


FIGURE 4—Diagrammatic presentation of the Round-Wound core-coil assembly. The core is wound of continuous strip of oriented silicon steel of various widths to give a core of cruciform cross section. Core is not unwound or cut, because coils are wound directly onto the completed, annealed core. Coils surround a maximum of the core circuit. They present a relatively large area to cooling oil.

**LINE MATERIAL Transformers**

**Complete Coordinated Equipment for Distribution Today**

L-M's NEW PID
5 KV 100 ampere
intermediate duty cutout.
Reflective markings easily seen from the ground identify the door and cutout. Doors are easily removed and replaced with a switch stick, for safety.
Cutout rating and date of manufacture sandblasted into side of box for permanent identification.
5000 V
100 A
LM-52

# L-M's New PID Cutout Provides Up To 166% Higher Interrupting Capacity At 20% Lower Cost

**Costs 20% less than standard 100 ampere cutout; interrupting capacity 166% higher at 2.5 kv (8000 amperes), 66% higher at 5 kv (5000 amperes). Box will accept all standard 50 ampere doors, thus permitting one box to be used for both 50 and 100 ampere service. Also takes 200 ampere switch blade door.**

L-M's PID Cutout is designed to provide a 100 ampere intermediate duty cutout at an appreciable saving over standard 100 ampere cutouts. Boxes are smaller and more compact than standard 100 ampere cutouts—they are the same size as a 50 ampere cutout but terminals and contacts are heavier. Thus the cutout will take any of L-M's 50 ampere doors, as well as the 100 ampere intermediate duty and 200 ampere switch blade door.

The non-disconnecting door provides positive link ejection and circuit interruption even on low current faults.

Both cutout and switch blade doors can be removed and replaced with standard switch sticks, providing additional safety.

Cutout and disconnect switch doors are easily identified from the ground by the reflecting markings on the doors. Rating and date of manufacture are sandblasted into sides of box for permanent identification.

**Get Details on L-M Fuse Cutouts**

L-M offers complete families of open and closed type cutouts to meet a wide range of requirements. Interchangeable doors offer low first cost and economical capacity increases as loads are increased. For complete information ask the L-M Field Engineer or write for bulletins. Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

**LINE MATERIAL**
**fuse cutouts**

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**Complete Coordinated Equipment for Distribution Today**

# ALUMINUM CONDUCTOR ACCESSORIES

# AVAILABLE NOW IN AMPLE SUPPLY

To meet the increasing demand because of the rapidly growing acceptance of aluminum conductor, more and more manufacturers now produce aluminum conductor accessories as standard items. Here is a partial list of manufacturers offering a wide choice of conductor accessories:

| | | |
|---|---|---|
| **Anderson Brass Works, Inc.** | **700 N. 44th Street** | **Birmingham, Ala.** |
| **Bethea Company, Inc.** | **P. O. Box 1407** | **Birmingham, Ala.** |
| **Bodendieck Tool Company** | **325 E. Main Street** | **Taylorville, Illinois** |
| **Burndy Engineering** | | **Norwalk, Conn.** |
| **A. B. Chance** | | **Centralia, Mo.** |
| **Fargo Mfg. Co., Inc.** | | **Poughkeepsie, N.Y.** |
| **Hubbard & Company** | **6301 Butler Street** | **Pittsburgh, Pa.** |
| **Jasper Blackburn Corp.** | **35 Madison Street** | **St. Louis, Mo.** |
| **James R. Kearney Corp.** | **4236 Clayton Avenue** | **St. Louis 10, Mo.** |
| **Line Material Company** | | **Milwaukee, Wis.** |
| **W. N. Matthews Corp.** | **3850 Delor Street** | **St. Louis 16, Mo.** |
| **The National Telephone Supply Co.** | **5100 Superior Avenue** | **Cleveland 3, Ohio** |
| **Ohio Brass Company** | | **Mansfield, Ohio** |
| **Penn Union Electric Corp.** | | **Erie, Pa.** |
| **Preformed Line Products Co.** | **1051 Power Avenue** | **Cleveland 14, Ohio** |
| **Reliable Electric Co.** | **3145 Carroll Avenue** | **Chicago 12, Illinois** |
| **Thomas and Betts** | **36 Butler Street** | **Elizabeth, N. J.** |

Aluminum conductor accessories may be obtained by contacting these manufacturers direct. For immediate assistance, simply call or write any Kaiser Aluminum office.

**Act now!**
Give immediate consideration to Kaiser Aluminum conductor on your next job. It will cut your costs up to 25 per cent.

**Send for free folder**
giving complete engineering data on new Kaiser Aluminum covered conductor—both weatherproof line wire and self-supporting Triplex. Kaiser Aluminum & Chemical Sales, Inc., Oakland 12, Calif.

**Kaiser Aluminum**

***setting the pace—through quality and service***

# There's a *Low Cost* Westinghouse Demand Meter...

- **for every circuit**
- **for every rate**
- **for every mounting!**

Here are the answers to all your needs for less costly metering of kw and kva demand. It's a *complete* line of Westinghouse Demand Meters, engineered specifically to shave your specialized metering costs. In every case the designs are . . .

**Simple** . . . only a minimum number of moving parts. Block Interval types are used with standard Westinghouse Meters. Thermal demand elements are combined with conventional watthour meters.

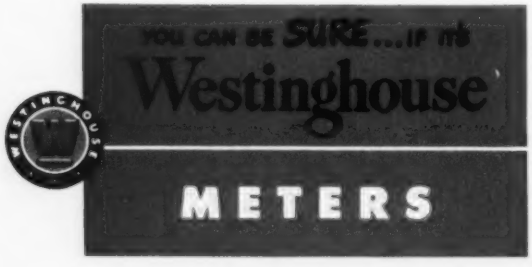
**Compact** . . . no larger than a 3-element watthour meter except for increased depth.

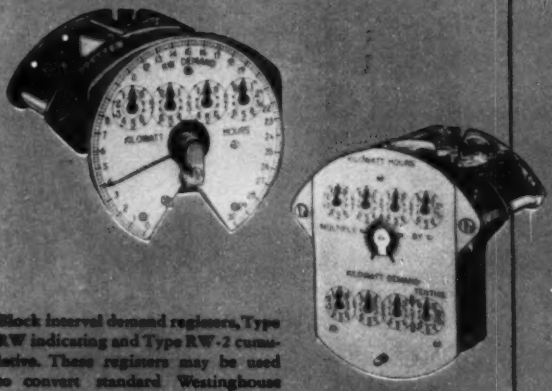
**Easy to install** . . . just one mounting for both watthour and demand meter . . . connections are interchangeable with standard watthour meters.

**Easy to maintain** . . . in all units you'll find the same low maintenance characteristics you enjoy in Westinghouse Standard Watthour Meters.

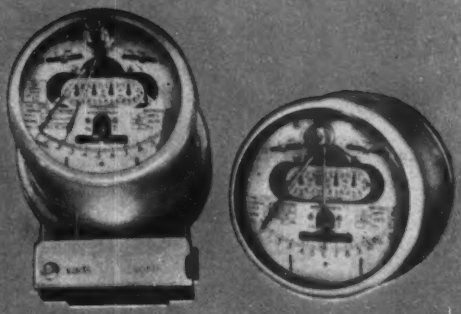
Specific examples of Westinghouse pioneering in pace with your needs include: the first polyphase, combination thermal unit in a socket base; the first and only combination polyphase watthour and thermal kva demand meter.

It is the kind of skillful, pace-setting engineering that stands behind every meter that Westinghouse builds today. It's another good reason to always specify . . . Westinghouse. J-40425



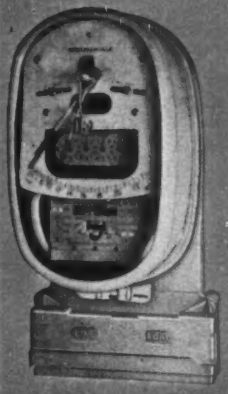


Block interval demand registers, Type RW indicating and Type RW-2 cumulative. These registers may be used to convert standard Westinghouse Watthour Meters to demand types.



CAH and CSH single-phase, combination watthour and thermal demand meters. In the Type CSH a 50-ampere meter with 48-kw (200-amp) full-scale rating is available.

CSH and CAH polyphase, combination watthour and thermal demand meters. CSH-8 is the first polyphase meter available for socket mounting.



KCA polyphase, combination watthour and thermal kva demand meters . . . available for all services under all conditions of current, voltage and power factor.

QCS and QCA single or polyphase, combination watthour and thermal ampere demand meters . . . available in all standard ratings.

## GET COMPLETE INFORMATION...

Complete details, including operating and construction features, application information and wiring diagrams, are contained in individual catalogs covering each of the meters shown here. Ask your Westinghouse representative for copies or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

Type RW (Indicating) Demand Registers . . . C.S. 42-315

Type RW-2 (Cumulative) Demand Registers. C.S. 42-316

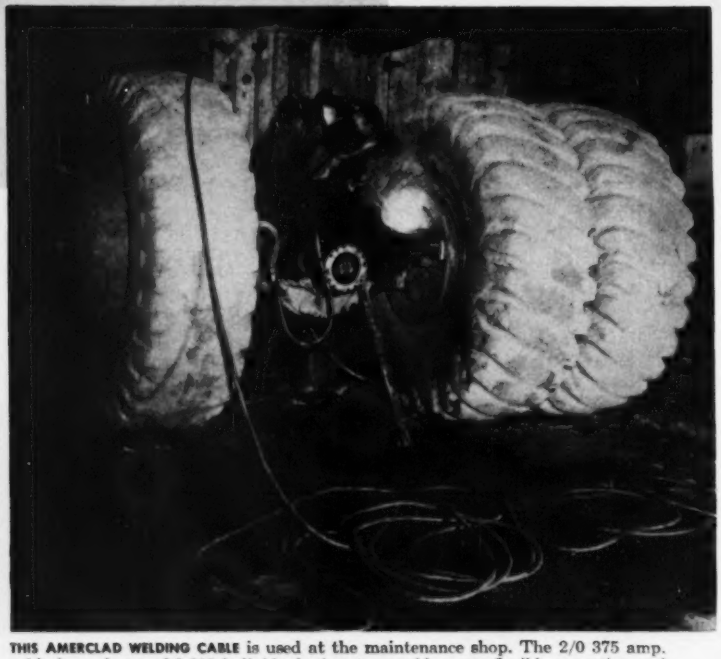
Type CSH and CAH (single-phase) Combination kw Demand . . . . . C.S. 42-337

Type CSH and CAH (Polyphase) Combination kw Demand . . . . . C.S. 42-338

Type KCA Combination kva Demand . . . C.S. 42-340

*the rocks*

**NOTICE THE FLEXIBILITY** of this No. 4, 5,000 volt AMERCLAD Cable. It contains a special crepe paper slipper applied over the conductors to permit easy bending.



**HERE ARE** the drills that punch out thousands of feet of holes every day. Notice how easily the cable can be coiled around the take-up reels.

**THIS AMERCLAD WELDING CABLE** is used at the maintenance shop. The 2/0 375 amp. cable is made up of 3,325 individual wires to provide super-flexible operation and ease the strain on the operator's wrists.

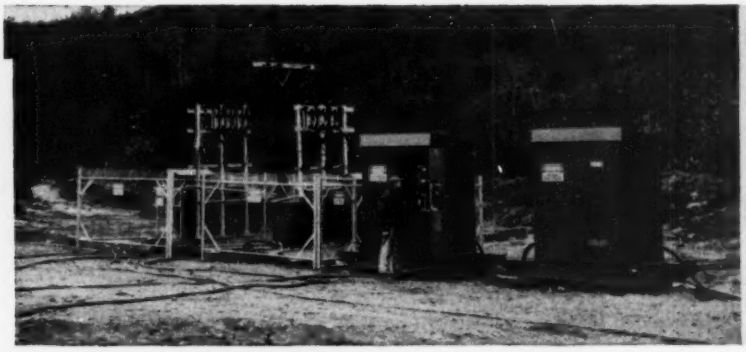
## *A STANDARD Cable for every*

- ▶ paper & varnished cambric cables
- ▶ asbestos cords and cables
- ▶ aerial, underground & submarine cables
- ▶ shovel & dredge cables

AMERICAN STEEL & WIRE DIVISION
USS
AMERICAN ELECTRICAL WIRE AND CABLE
UNITED STATES STEEL

# U·S·S AMERICAN ELECTRICAL

# *get so hot you can't touch them*
# *but* Amerclad
# withstands the heat



**THESE ARE TYPICAL** switch houses and portable substation at the mine. Average length of cable used is 2,500 feet. The company has been using the original AMERCLAD for 7 years.

ONE of the nation's leading coal producers is stripping an area that is honeycombed with old mines. Many of these mines are burning, some for as long as 20 years. The rocks get so hot that you cannot walk on them or touch them, but miles of U·S·S AMERCLAD lie on the blistering rock without damage. Naturally, the mine operators try to protect the cable, but a lot of it has to lie on the ground.

This mine uses about 11 miles of AMERCLAD heavy-duty portable cable for power shovels and drills. The cable is unavoidably pulled over razor-sharp rock, soaked in acid water and exposed to the direct rays of the sun. In addition, thousands of yards of dirt and rock are blasted every day, and a lot of it comes down hard on the cable.

Despite all this, the AMERCLAD Cable is turning in a fine record of service. *It has to*, because, as the Chief Engineer puts it, "Every time a shovel is idle, there is a loss of production that is never made up."

If you have an extremely abusive use for portable cable or cord, let us show you just what AMERCLAD can do. There is a standard AMERCLAD Cable or Cord for every special application—whether it's a hand-operated drill, or a river dredge. Just send the coupon.

**AMERICAN STEEL & WIRE DIVISION**
**UNITED STATES STEEL COMPANY**
**GENERAL OFFICES: CLEVELAND, OHIO**

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
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## SPECIAL Job!

- ▶ **oilproof portable cords**
- ▶ **plastic machine tool & building wire**
- ▶ **special purpose cords & cables**

## WIRE & CABLE

**SEND THE COUPON**

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Room EE-92, Rockefeller Building, Cleveland 13, Ohio
☐ Please give me more information on U·S·S AMERCLAD.
☐ Have representative call.

Name.....
Title.....
Company.....
Address.....
City.....State.....

**UNITED STATES STEEL**

T.J. Cope INC.

# COPE Cable Trough is Used by Utilities and Industrial Plants Throughout the World

The ease and economy of installing standard COPE Cable Trough has given it wide acceptance among the leading utilities and industrial plants around the globe. They realize, as will you, how COPE Cable Trough saves on time, material and costs.

COPE Cable Trough Installation at Gary Sheet & Tin Mill—U. S. Steel Company

## A few of the Users of COPE CABLE TROUGH

Allis-Chalmers Manufacturing Co.
Aluminum Company of America
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Borg-Warner Corp.
The Budd Company
Carolina Power & Light Co.
Central Hudson Gas & Electric Corp.
Cincinnati Gas & Electric Co.
Cleveland Electric Illuminating Co.
Commonwealth Edison Co.
Connecticut Light & Power Co.
Consolidated Gas, Electric Light & Power Co. of Baltimore
Delaware Power & Light Co.
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Goodyear Tire & Rubber Co.
Indianapolis Power & Light Co.
International Harvester Co.
Island of Iceland
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Jones & Laughlin Steel Corp.
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Republic Steel Corp.
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Virginia Electric & Power Co.
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# For Most Cable Trough Installations . . .

Our exhaustive list of standard COPE Cable Trough parts can easily be worked into your plans. The simplified design of standard COPE Cable Trough actually saves you three ways — materials, labor and costs.

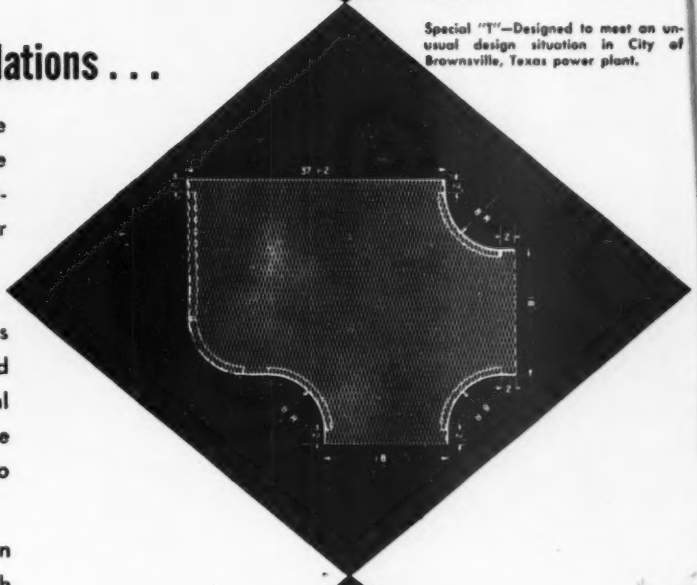
Standard Installation of COPE Trough at Danskammer Point Steam Station, Central Hudson Gas & Electric Corporation.

## As Well As . . .

# For Unusual Cable Trough Installations . . .

Where the standard COPE Cable Trough cannot answer those "special situations," COPE Engineers will help you with your problem. We will, as we have for hundreds of users, furnish special fittings. All we require is an outline of your problem and we will then design any special fittings necessary to adapt the standard COPE Cable Trough to your specific job.

Please request full information on standard COPE Cable Trough from us today.



Special "T"—Designed to meet an unusual design situation in City of Brownsville, Texas power plant.

**T. J. COPE, INC., 711 SOUTH 50th ST.**
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*You know Cope by these products*

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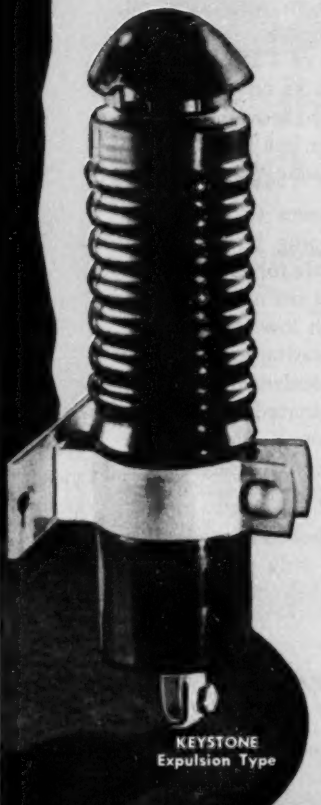
## CRYSTAL VALVE

***THE MULTI-PURPOSE ARRESTER***

Millions of Crystal Valve Arresters, on all types of installations and under every kind of adverse lightning condition, have achieved an unsurpassed performance record all over the world.

Accurately spaced high-speed multiple spark gap elements, with smooth, flat arcing surfaces, insure low impulse spark-over. Oxidized silicon carbide valve element guarantees fast surge voltage reduction, low IR voltage and quick suppression of follow current. Non-deteriorating . . . no radio interference . . . moisture-proof.

Crystal Valve Ventilated Spark Gap Arresters have scored better than 99% perfect in operational rating over the past 16 years. Glass body for gap housing makes inspection easy. Vents permit free air circulation, prevent corrosion.




## KEYSTONE EXPULSION TYPE

***IDEAL FOR RURAL LINES***

The parallel discharge paths found only in the Keystone Expulsion Type Arrester make it particularly suited to rural circuits. Low impulse spark-over voltage means maximum safety to transformer insulation. Extinguishment of follow current flow is so rapid that line voltage disturbance rarely occurs.

Rugged construction assures long, trouble-free life. Ventilated body guarantees dryness at all times.

*Write today for latest technical data on Crystal Valve or Keystone Expulsion Arresters. No obligation.*

**Philadelphia 32, Pa.**

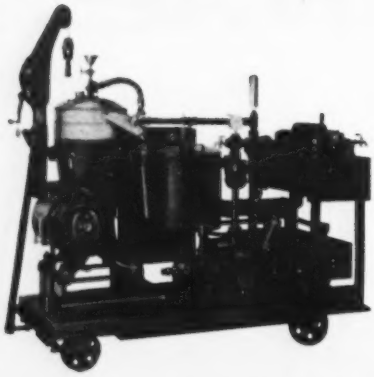
*Represented in Canada by Lyman Tube and Bearing, Ltd., Montreal and Toronto*

# NOTHING IS AS EFFECTIVE AS CENTRIFUGAL FORCE

For removing water from insulating oil, nothing beats centrifugal force. Applied to best advantage in the bowl of a De Laval Oil Purifier, centrifugal force acts on the wet oil instantly and effectively. It throws out every particle of water, whether it is a few drops in many gallons or a relatively large amount.

It enables power engineers to be sure — dead sure — that the oil going back in their transformers is absolutely safe for reuse. High dielectric is restored without the need to resort to high temperatures. Such low temperature purification has several advantages. For instance, the probability of condensate forming in the receiving tank is eliminated. Moreover, low temperature purification prevents rapid reduction in dielectric strength after the oil has been purified.

The low-watt density heaters used with De Laval Oil Purifiers not only prevent carbonization of the oil but keep heating costs down as well.



THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
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**DE LAVAL**

**INSULATING OIL PURIFIERS**

# ZOOMING in importance

## the advantages of these new all-plastic, light-weight cables

Desirable as they are in any situation, the special advantages of Ansonia Ankoseal Cables reach imperative proportions in the present emergency.

For these cables help the public utility in three important ways. They are lower in cost in most cases. They reduce installation time and thus conserve manpower. They have long-life qualities that reduce frequency of replacement.

All these advantages are yours without sacrifice of, while in many cases there is an improvement of, electrical properties.

***Investigate Ansonia Ankoseal for—***

***SUPERVISORY CONTROL CABLE***
***STATION CONTROL CABLE***
***STREET LIGHTING CABLE***
***METER CABLE***

***We'll gladly send additional information.***

**THE ANSONIA ELECTRICAL COMPANY**

SUBSIDIARY OF NOMA ELECTRIC CORPORATION

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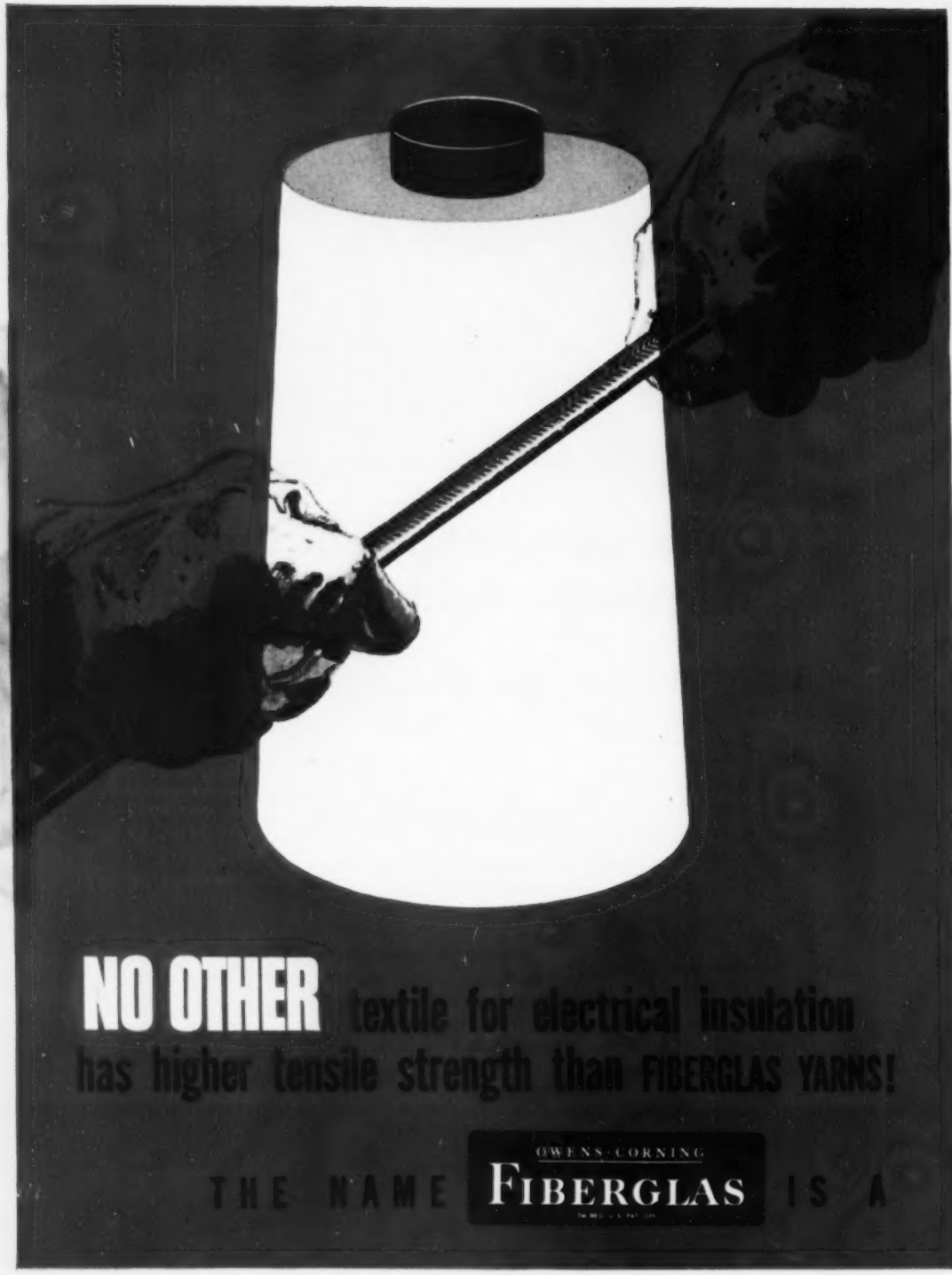
NO OTHER textile for electrical insulation
has higher tensile strength than FIBERGLAS YARNS!
THE NAME OWENS-CORNING FIBERGLAS IS A

IF YOU MAKE OR USE

# ELECTRICAL EQUIPMENT

IT WILL PAY YOU TO SPECIFY

# FIBERGLAS* *insulating materials*

High tensile strength, plus small diameter, in yarns used in electrical insulation permits the reduction of weight and bulk of electrical equipment.

That's why more and more wire and cable and electrical apparatus manufacturers are turning to insulating materials made with Fiberglas yarns.

Fiberglas yarns are glass in fibrous form. Even the smallest diameter Fiberglas yarn surpasses all other high temperature textile yarns in break strength. Fiberglas-braided wires and cables are thinner, lighter, easier to install. Fiberglas tapes, varnished cloths, sleeving and tubing, cords and laminates also save space . . . permit the design of less bulky wire, cable and apparatus. And, despite lack of bulk, Fiberglas-based insulating materials permit uprating of equipment and service under higher operating temperatures.

So, if you make or use electrical equipment, remember to specify FIBERGLAS.

Owens-Corning Fiberglas Corporation, Electrical Sales Division, Dept. 858, 16 East 56th Street, New York 22, New York.

FIBERGLAS YARNS ALSO GIVE YOU THESE COST-SAVING ADVANTAGES

**MOISTURE RESISTANCE**
Wire, cable, and apparatus resist moisture better, if they're made with Fiberglas materials.

**OIL AND ACID RESISTANCE**
Fiberglas insulating materials resist the ravages of oils and acids.

**EXCELLENT SPACE FACTOR**
Tough, small-diameter Fiberglas yarns permit design of smaller, lighter high temperature electrical equipment.

**HEAT RESISTANCE**
Fiberglas insulating materials resist break-down under heat.

GOOD GUIDE TO A GOOD BUY!

*Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation

**. . . are Heavier—
Stronger—
Easier to Install**

There is a P-L Anchor to meet your requirements for any size job . . . *all along the line* . . . from the smallest distribution lines to heavy power transmission lines. Available in six, eight and ten inch diameters with holding power classifications from 2500 pounds to 20,000 pounds. P-L Anchor superiority has been proved by use in over a million installations. All P-L Anchors are made of heavy-gauge, high-strength steel . . . are easy to install . . . give maximum holding power with minimum installation cost.

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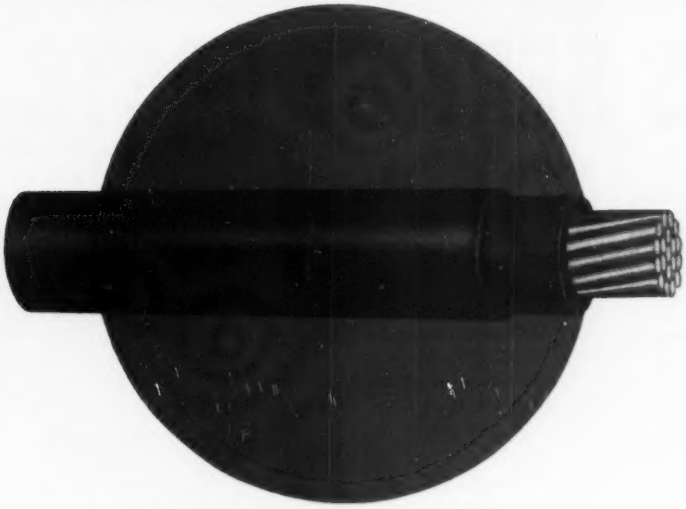
## SIGNAL AND CONTROL WIRING • SHOP WIRING • REWIRING



# SIMPLEX ANHYDROPRENE WIRES

For wiring installations where the use of ducts is required, you'll find ANHYDROPRENE Wires hard to beat for long, trouble-free service and economical operation. The reason? ANHYDROPRENE'S Anhydrex insulation and thin — but tough — neoprene jacket are more than equal to the hazards that make short work of ordinary wires. In addition, they contribute to low-cost installation and maintenance.

Take a look below at the features they provide and you'll see what we mean. Specify ANHYDROPRENE for your future wiring jobs and you'll see what **they** mean in more-satisfactory performance and in dollars saved.

- Flexibility
- Light Weight and Small Diameter
- Unexcelled Resistance to Water and Moisture
- Protection against Oils, Grease and Flame
- Resistance to Acids, Alkalies and Corrosive Chemicals
- Elimination of Braids that Fray and Rot
- Easy Pulling through Ducts without Use of Lubricants
- Molded or Stamped Markings for Instant Identification

For more-complete information write for Bulletin 115.

*Simplex* - WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 SIDNEY STREET,
CAMBRIDGE 39, MASS.

# New G-E Radio System in tough mountain terrain

# CUTS SERVICE COSTS 50%

**Radio links utility offices and power plants over 10,000 square mile area despite elevations up to 7,000 feet.**

HIGH TENSION transmission lines in the South Dakota mountains presented difficult maintenance problems to the Black Hills Power and Light Company at Rapid City. Snow and high winds made land line communication impractical. General Electric's CAS* engineers solved the problem and cut the cost of the whole operation in half.

Today, 2-way radio carries voice messages instantly throughout the system. Ten General Electric land stations and 28 mobile radio sets in cars, service trucks, line trucks and power wagons, keep communications open 24 hours a day the year 'round.

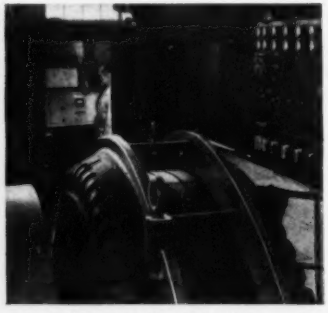
The CAS* Man at the G-E office near you is a specialist in communication problems. His information and help are as near as your telephone. *General Electric Company, Electronics Park, Syracuse, New York.*

*Communications Advisory Service

**Elevation 6800 feet.** Terry Peak installation has General Electric control transmitter-receiver combination and 250-watt central station unit.

**69 kilovolt structure** is inspected by lineman on pole while Henry Ostreich, superintendent of construction, talks to headquarters by car radio.

**G-E 50-watt unit** in Osage power plant. Ed Geddes, chief engineer, places call to truck in motion 55 miles away via mountain-top relay.



**Power plant control console** links mountain transmitters with main station and office units. Utility plans to add more G-E radio as load grows.

## Complete Communication Systems for Industry

## GENERAL ELECTRIC

# NEW! SIMPLIFIED! SMALLER!

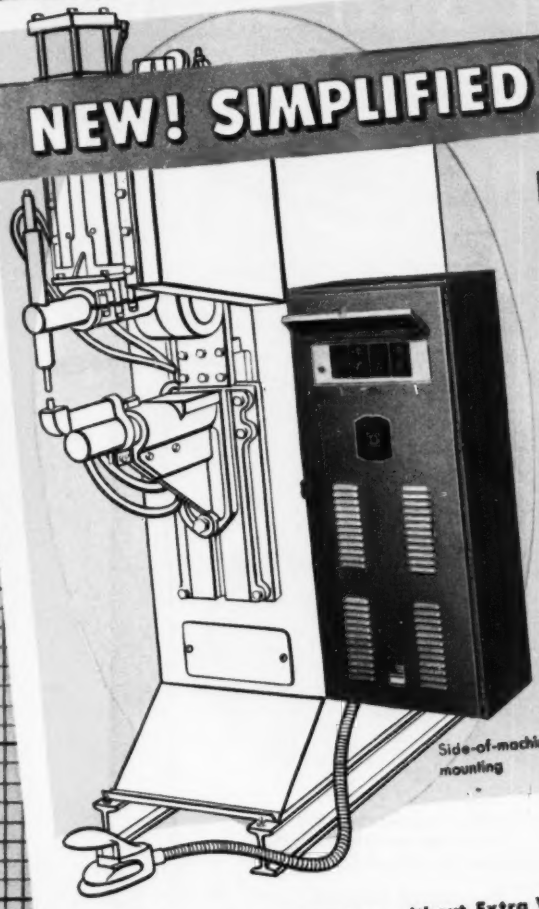
## ELECTRONIC NON-SYNCHRONOUS WELDER CONTROL

**Here is design simplification** that affords significant advantages—easy installation, less maintenance, smaller size, mounting versatility.

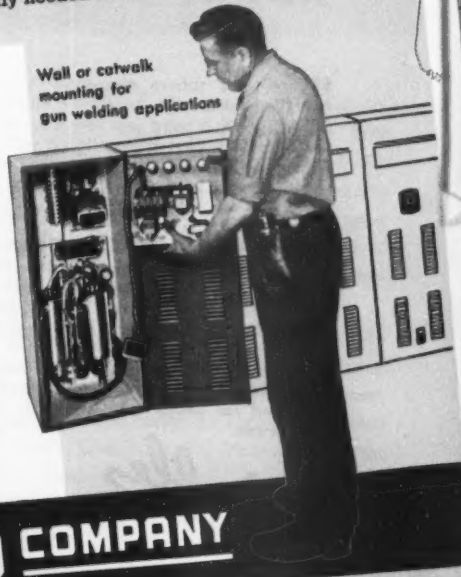
Drastically simplified NEMA 3B weld and sequence timing circuit requires only 4 tubes plus valve relay and firing relay. Extreme consistency and timing accuracy are maintained. All tube circuits are "fail-safe." Firing of power tubes is synchronized to minimize transients and ease stress on welding transformer.

Interchangeable NEMA 3B and 5B timer panels are quickly detached from door. Plug-connectors to power pack in cabinet permit easy replacement.

Much smaller in size, this new controller (15" x 15" x 37") requires little more space than formerly needed for the ignitron contactor alone.



Side-of-machine mounting



Wall or catwalk mounting for gun welding applications

**Wall or Machine Mounting without Extra Work**

• Enclosure design permits wall or side-of-machine mounting with the same controller and without the additional trouble of relocating adjuster dial assembly. Installation is made easier by generous wiring space below contactor, and vertical wiring channel extending the full height of the cabinet. All components are arranged for maximum accessibility.

*Write for Bulletin 8992* on Electronic Non-Synchronous Welder Control and its application to spot and projection welders. Address Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin.

SQUARE D COMPANY

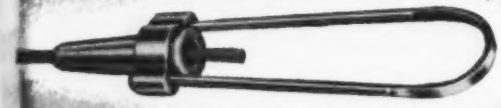
# SPLICE or DEADEND STEEL STRAND
## *in seconds without tools*

*Reliable*

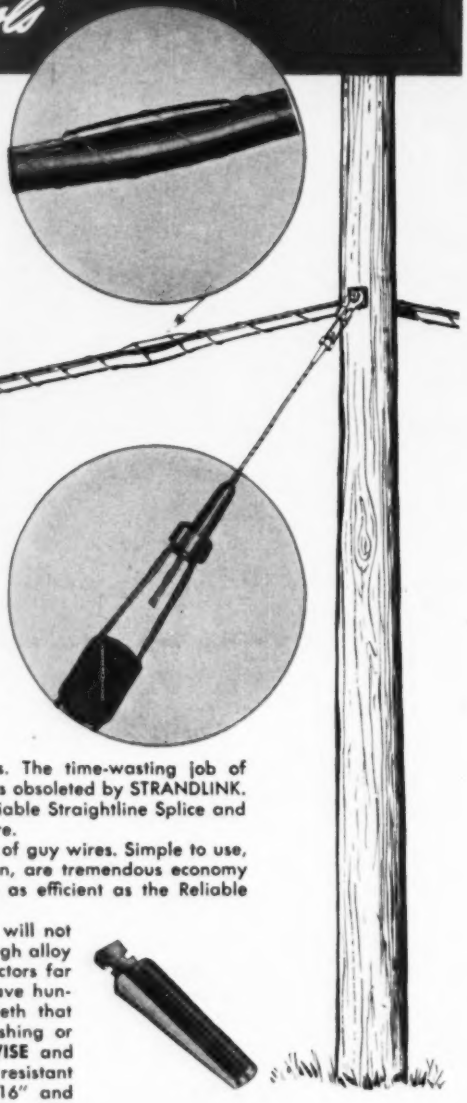
**STRANDLINK**

*or*

**STRANDVISE**



**can cut installation time by 90%**



**STRANDLINK** splices messenger wire in seconds. The time-wasting job of handling nuts, bolts, hardware and johnny balls is obsoleted by STRANDLINK. STRANDLINK is used just like the well known Reliable Straightline Splice and costs far less than conventional splicing hardware.

**STRANDVISE** finds its greatest use in installations of guy wires. Simple to use, the time and wire saved, especially on relocation, are tremendous economy factors. STRANDVISE is just as easy to use, just as efficient as the Reliable Straight-thru Deadend.

Both **STRANDLINK and STRANDVISE** grip surely, will not slip. The cartridges of heat treated aluminum, tough alloy yokes, and stainless steel bails have strength factors far beyond that of the strand. The gripping jaws have hundreds of case-hardened, Zinolite-plated steel teeth that grip sharply, hold permanently yet without gashing or exposing bare steel of strand. Every **STRANDVISE** and **STRANDLINK** is factory treated with corrosion resistant lubricant for protection. Available in 3/8", 5/16" and 1/4" sizes.



*Reliable*

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POWER-LINE CONNECTORS and CONSTRUCTION SPECIALTIES

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## Year in--Year out ECONOMY...

# HAZA... WATERTI...AZAPRENE® CONTR... CABLES

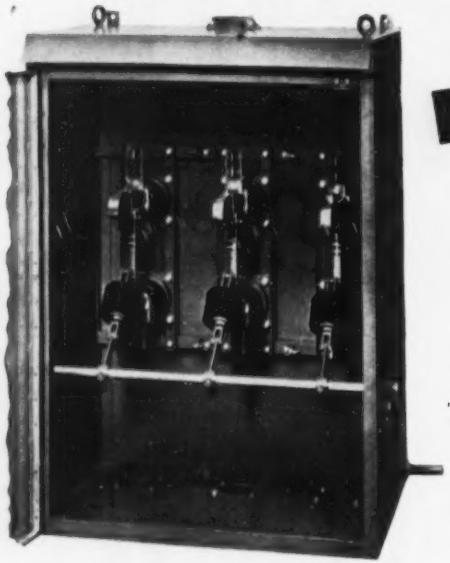
Assurance of day in and day out maintenance-free performance makes Hazard Watertite-Hazaprene cable construction ideal for control circuits. From the inside out — from the corrosion-resistant Hazaloy coated conductors to the rugged Hazaprene sheath — Hazard Watertite-Hazaprene is engineered for long-lived economy.

Watertite-Hazaprene amply meets the exacting requirements of control cable service. Rubber fillers prevent the wicking-in of moisture . . . firm, electrically strong, long-lived Watertite rubber insulation prevents deformation . . . the tire-tough Hazaprene ZBF sheath offers superior resistance to flame, oil, acid, alkali, sunlight, moisture and mechanical damage. The ZBF sheath is a research-developed, service-tested protective covering, compounded of neoprene to Hazard's special Zinc Borate Formula; it is pressure-vulcanized in a continuous lead sheath to give a smooth, dense surface that resists abrasion and tearing.

There's a Watertite-Hazaprene Cable for every control circuit requirement. For further information about these dependable, money-saving control cables, write to Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD

# High Voltage Current Interruption Without External Arcing



3 P.S.T. 400 ampere 15KV metal enclosed Air Interrupter Switch. Enclosure door open, insulating barriers not shown.

## CHECK THESE 3E FEATURES

**SAFETY** . . . All metal enclosure designed in accordance with the best engineering and manufacturing practices. For additional safety, positive interlocks, with doors and related equipment are available.

**ACCESSIBILITY** . . . These compact 3E Switches provide easier inspection, maintenance and adjustment in a normal amount of space.

**ECONOMY** . . . There are many conditions under which 3E Air Interrupter Switches when combined with power fuses can spell real economy. Switches are used for load interruption and fuses for short circuit protection . . . doing away with more expensive circuit interrupting equipment.

3E Air Interrupter Switches will safely interrupt loads up to 600 amperes at 15,000. They provide a visible gap for isolation of apparatus, and use self-generated gas blasts to extinguish the fully confined arc. No oil or other inflammable liquids are used.

**Consult your nearest 3E representative or write us for information as to how the 3E Interrupter Switch can be applied to your switchgear requirements.**

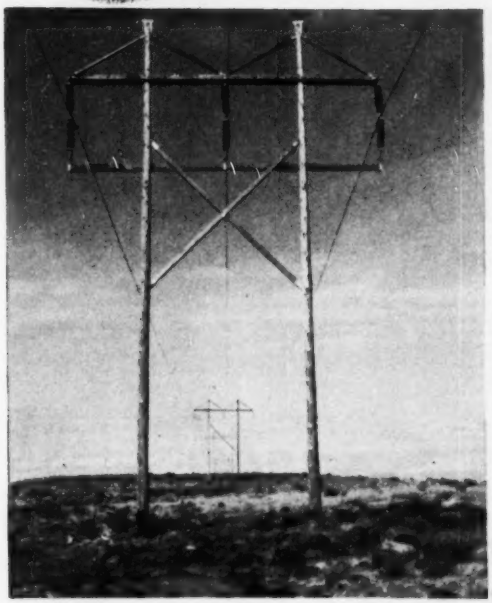
**ELECTRICAL ENGINEERS EQUIPMENT CO.**

MELROSE PARK, ILLINOIS

# 3E AIR INTERRUPTER SWITCHES

# Demand PROOF OF PERFORMANCE

## for Locations like these

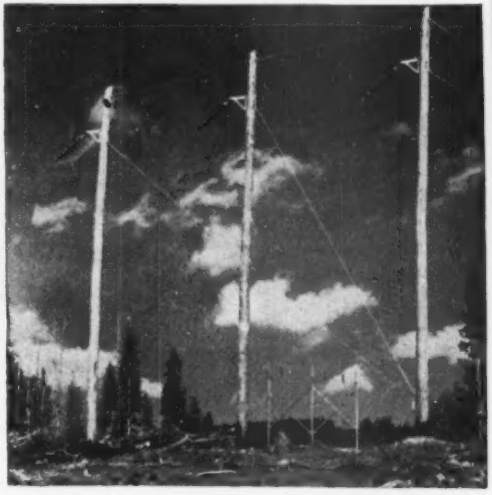


*Thomas Insulators make certain that this 230-kv hold-down structure will give satisfactory service for decades to come.*

"Where the going is rough . . . where trouble-free performance is a must . . . that's where Thomas *superior insulator quality* really pays off."

Shown on this page are just two of the many Thomas installations on the lines of a large Western Utility. For many years, this Customer has given us order after order. Such *repeat orders* from this and other companies are the best testimonials to the long life and outstanding performance of Thomas Insulators.

After all is said . . . it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Throughout the world, Thomas Insulators have been establishing service records since the advent of the Electrical Industry. Why gamble?



*For this 69-kv medium-angle structure, Thomas Insulators have the stamina that assures long life and trouble-free performance.*

*The R. Thomas and Sons Company is a manufacturer and designer of all types of porcelain insulators . . . pin-type, switch, suspension, spools, guy-strain, bushings and special high-voltage porcelain. In addition, Thomas supplies associated line hardware, clamps, fittings, preformed armor rods, and so on.*

SPECIFY THOMAS INSULATORS—THE BEST BY LINE TEST

*—Since 1873—*

## The R. Thomas and Sons Co.

LISBON, OHIO

NEW YORK CHICAGO

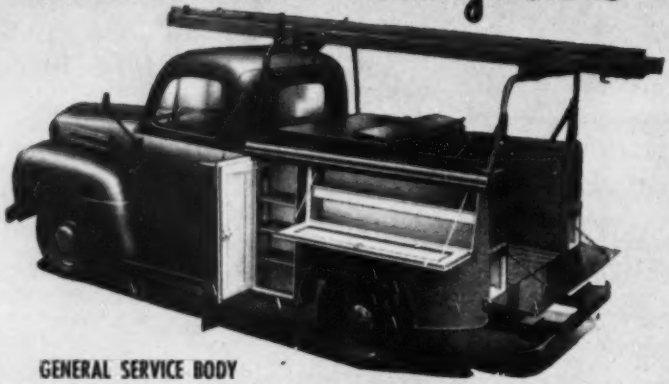
1873 THOMAS INSULATORS our 79th year RELIABILITY 1952

**Sales Representatives: C. G. Anderson, *Chicago* • E. B. Anderson Co., *Detroit* • Ken H. Best, *Seattle* • R. E. Cunningham & Son, *Los Angeles* W. H. Eddy Products Co., *Phoenix, Ariz.* • Engineer Sales Corp., *St. Petersburg* • R. F. Hamilton & Associates, *Denver* • Geo. E. Henn Company, *San Francisco* • W. J. Hugo, *Minneapolis* • Leiser & Company, *Philadelphia* • John G. Pettijohn Company, *Knoxville* • H. E. Ransford Co., *Pittsburgh* • J. F. Schaefer & Co., *Kansas City* • R. J. Sullivan & Company, *Boston* • Tafel Electric & Supply Co., *Louisville* • Walter E. Thompson, *Birmingham* • Triangle Electric Supply Company, *El Paso* • United Electric Supply Co., *Salt Lake City* • Williamson Sales Co., *Shreveport, Amarillo, Dallas, Houston, New Orleans, Pine Bluff* • *Representatives in other principal cities***

# "The Accepted Standard with Utilities Everywhere"

**LINE CONSTRUCTION BODY (400C)**
This workhorse of the utility industry can be furnished in lengths from 9' to 14' for any type of utility construction work.

**REVOLVING AERIAL LADDER**
Models available in working heights of 23' 6", 26' 6", 30' 6", and 32' 6" for all styles of bodies.



**GENERAL SERVICE BODY**
Available in a wide range of body styles to fit operating requirements in all phases of the utility industry. Models can be furnished for ½, ¾, 1, and 1½ ton chassis. Compartments can be equipped with shelves, bins, and accessories to suit individual needs.

**COMPARTMENT SECTIONS**
Available in 74", 84", and 104" lengths for all standard pick-up or express-type bodies.

**LIGHT DUTY MAINTENANCE BODY (350)**
This compact unit is widely used for service and light duty construction. Fold-over derrick can handle 40' poles.

## The 1 Source for all types of utility bodies and equipment!

There's no need to look further than *Powers-American* to solve all your utility body and equipment needs. Whether the job calls for a small service body for repair work, a line body for large construction jobs, or special equipment such as towers or ladders, *Powers-American* is *your* answer.

Leadership in construction, maintenance and service work in all phases of the public utility industry guarantees long life and trouble-free service. Write today for more information.

**There are many styles of *Powers-American* Bodies not shown here. Write for descriptive catalog today.**

**POWERS** *American* DIVISION

ACF

PUBLIC UTILITY BODIES AND EQUIPMENT

McCABE-POWERS AUTO BODY COMPANY

# NOW, *Pushmatic*® protection for homes!

**Attractive** BullDog XD Electri-Center is convenient, safe. Handles all lighting circuits, plus 110V-240V range, dryer, attic fan and other service appliances, present and future.* Baked gray finish; can be painted to match walls.

## Specify modern, new, home-proved BullDog XD Electri-Centers

**(Successor to the Fuse Box)**

**Here's truly** modern, safe circuit protection for the house, packed with advantages for home owners and builders alike.

BullDog's new XD Electri-Centers, featuring famous Pushmatic® circuit breakers, provide for every electrical requirement — lighting, appliances, service items*. Just one inexpensive, easy-to-install panelboard does away with a welter of fuse boxes, separate switches and costly, unnecessary wiring.

Lower installation cost and foolproof push-button control and protection please home buyers. The housewife especially likes the safe, simple way Pushmatic works. When lights go out, she merely looks for the individual Pushmatic that says "OFF," and pushes it "ON." Presto! The Pushmatic resets instantly and lights go on again (unless short or overload still exists).

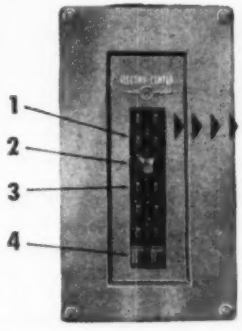
BullDog Pushmatic Electri-Centers offer the builder many advantages. They provide modern appearance and centralized efficiency that make the home more attractive and workable.

Get the full story today on these great new BullDog XD Electri-Centers. Contact your nearby BullDog supplier, or send coupon!

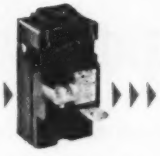
*Code (Art. 220) permits 6 subdivisions of main services.

### ONE CENTRAL CONTROL FOR EVERY CIRCUIT

Internal split bus bar separates panel into two groups of circuits. Pushmatics in upper section (1) provide individual protection and disconnect for 1- or 2-pole appliances. Tie handle (2) joins two 50-amp. Pushmatics that serve as convenient Main Disconnect for all branch lighting circuits in lower section. Space for 8 to 10 lighting circuits (3), depending on XD model. Unused circuits (4) can be plugged with filler plates, used when needed. Two models: this one with 12 circuits plus Main Disconnect for lighting; one with 18 circuits plus Main Disconnect.




### SAFER, AUTOMATIC PROTECTION



Here's safe, modern circuit protection, unmatched anywhere. Individual, interchangeable Pushmatic circuit breakers rupture circuits instantly whenever short or overload occurs. Foolproof. Trip-free. Give safe, automatic protection always. Guaranteed. Listed by Underwriters'.

### JUST PUSH A BUTTON

No resetting. Just one PUSH restores service, unless trouble still exists. Never any fuses to buy, no inconvenience. Rugged Pushmatics bolt to bus bars in a jiffy, never shake loose, need no servicing. Available in 15-, 20-, 30-, 40- and 50-amp. ratings to meet all present and future loads.

**BULLDOG**

**BULLDOG ELECTRIC PRODUCTS COMPANY**

DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

**PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS**

1902-1952 . . . SERVING INDUSTRY FOR 50 YEARS WITH FINER ELECTRICAL PRODUCTS

CLIP AND MAIL

BullDog Electric Products Company
7607 Jos. Campau Avenue, P.O. Box 177
Detroit 32, Michigan

Gentlemen:
Please send me free bulletin on your Type XD Electri-Centers for homes.

NAME _____

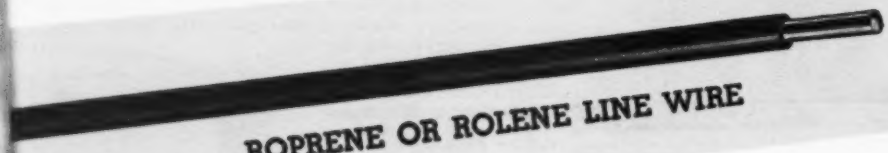
ADDRESS _____

CITY _____ ZONE _____ STATE _____

# You get these advantages with

# Rome Aluminum

ROPRENE SELF-SUPPORTING SERVICE DROP CABLE



ROPRENE OR ROLENE LINE WIRE

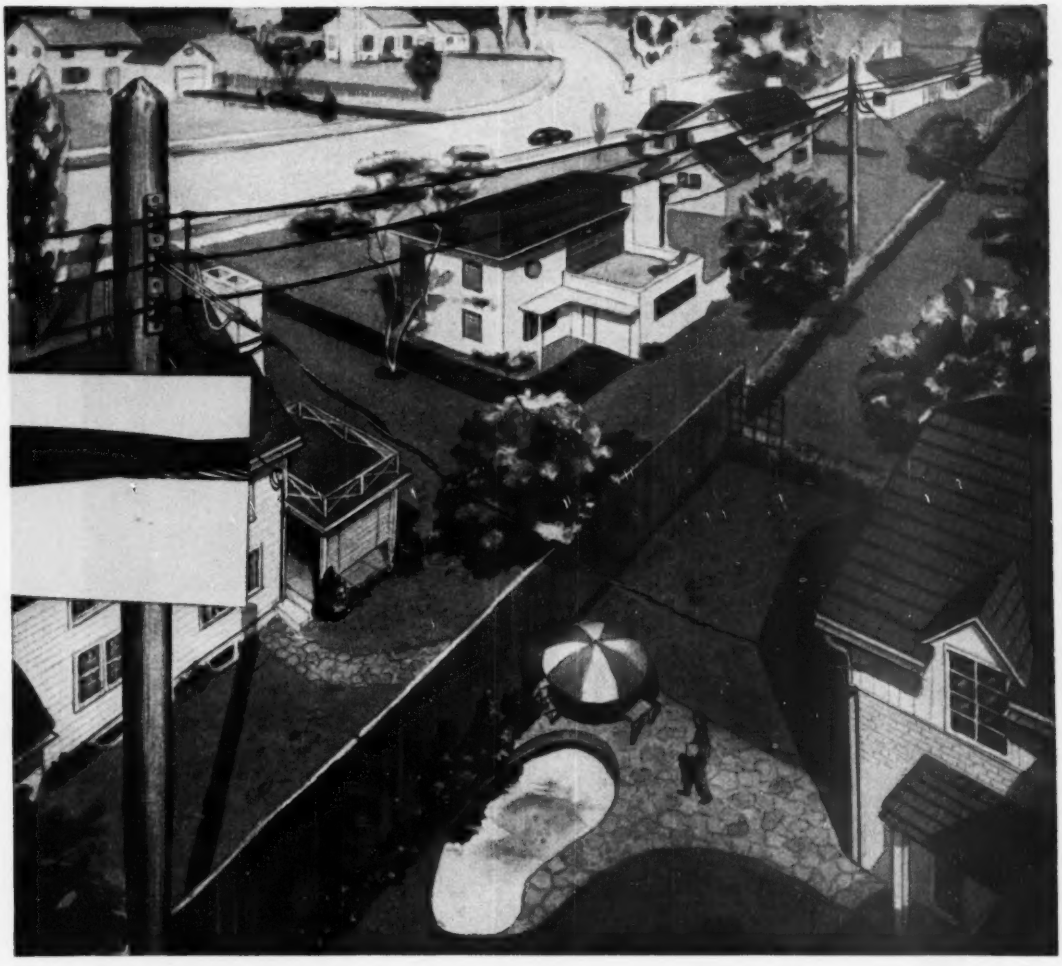
## 3 BIG REASONS...

Why you are bound to save money with Rome Aluminum Self-Supporting Service Drop Cable and Rome Aluminum Line Wire ... lower purchase cost ... lower installation costs ... longer service life.

**Lower purchase cost...** Depending upon the service involved, aluminum conductors cost less today.

**Lower installation costs...** Aluminum's lighter weight means easier and cheaper handling ... in many instances permits longer spans with fewer poles. The simplicity of Rome's Self-Supporting Cable construction means increased savings through cheaper hardware and ease of installation.

**Longer service life...** Aluminum has proved itself as a long-life conductor material. RoPrene (Neoprene) as well as RoLene (polyethylene) as either insulation or covering has exceptional resistance to sunlight, moisture, corrosive atmospheres and abrasion. With no braids to rot and festoon, replacement is minimized.



**Rome Aluminum Self-Supporting Service Drop Cable** is regularly supplied with two RoPrene (Neoprene) insulated power conductors of solid aluminum, spiralled around a bare neutral messenger of ACSR (aluminum conductor steel reinforced). This time-proven construction provides high strength, simplicity of installation.

**Rome Aluminum Line Wire** is available with covering of RoPrene (Neoprene) or RoLene (polyethylene) as specified. Here is low cost Line Wire having ease of handling, as well as long, non-festooning service life. Uniformly small diameters provide neater appearance, plus reduced wind and ice loading.

***It Costs Less to Buy the Best***

**Rome** ALUMINUM

**ROME CABLE CORPORATION, ROME, N.Y., AND TORRANCE, CALIF.**

# Wagner

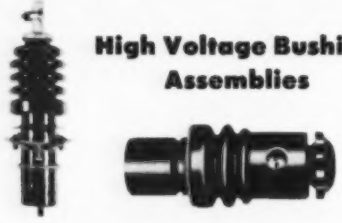
## Form W
## Core and Coil Assemblies

You can renew or up-rate your old or burned out transformers with brand new Wagner Form W core and coil assemblies, exactly like those used in new Wagner Transformers. It's easy—too, Wagner assemblies come to you complete with terminal board or tap changer, with leads ready to install in your tank. Universal mounting brackets are furnished with each unit to make the installation a simple job. Wagner assemblies have passed complete factory tests—are fully dried—and are then packed in Wagner transformer oil, which you may also use in your tank.

# Renew the life of old transformers!

Form W core and coil assemblies are shipped to you in sealed containers—ready to install without further testing or drying. Each assembly has a new serial number and name plate. In addition to factory-new core and coil assemblies, Wagner also can furnish bushing assemblies as described below.

### High Voltage Bushing Assemblies



Available in cover-mounted or tank wall mounted types to meet a wide range of requirements. Gasket, solderless connector-type terminal and clamping device are included—fuses can be furnished when specified.

### Low Voltage Bushing Assembly

Ready to install — includes porcelain bushing, gasket, solderless connector-type terminal and clamping device.

### Complete Factory Rebuilding Service

Including thorough cleaning and repainting, installation of new coils and insulation, all new gaskets, and a factory inspection. Guaranteed against defective material or workmanship for one year. If complete rebuilding is not necessary, repairs are made on a time and material basis. Write for Transformer Repair Schedule TU-88A.

### Field Repair Service

Wagner's Transformer Service Truck—completely equipped for field repairs... with the services of an expert—is available on schedule in certain localities. The cost of this exclusive Wagner service is nominal—write for information.

**WAGNER ELECTRIC CORPORATION**
**6400 Plymouth Ave., St. Louis 14, Mo., U.S.A.**

® Wagner Electric Corporation EST. 1891

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

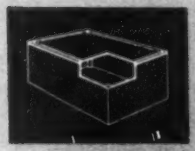
**BRANCHES IN 32 PRINCIPAL CITIES**

TS52-1

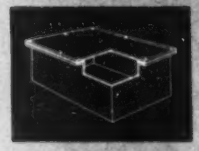
# STANDARD | CUSTOM

# ...CAST BOXES* BY HOPE

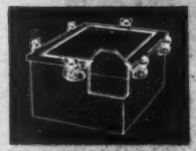
## STANDARD TYPES & SIZES



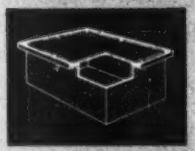
**UNFLANGED BOXES**
**H1200 Type**
**144 sizes**
from 4 x 2 x 2 to 48 x 36 x 17



**FLAT FLANGED BOXES**
**H8000 Type**
**87 sizes**
from 4 x 4 x 3 to 36 x 36 x 12



**HINGED COVER BOXES**
**H3200 Type**
**128 sizes**
from 5 x 5 x 3 to 36 x 36 x 12



**FLANGED RECESSED COVER BOXES**
**H7000 Type**
**51 sizes**
from 4 x 4 x 3 to 30 x 24 x 12

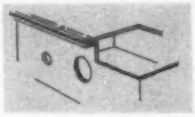
**CHECKERED COVER SIDEWALK BOXES**
**H5800 Type**
**53 sizes**
from 6 x 6 x 4 to 36 x 24 x 14

**STANDARD BOXES** are of strong, dense cast iron—hot dip galvanized for long service and attractive appearance. Weatherproof construction—rubber-gasketed closure prevents entry of rain, snow, dust or dust under normal conditions.

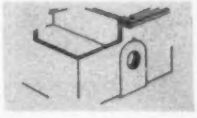
## CUSTOM VARIATIONS

You can specify any of these modifications in standard BOXES by HOPE —have them factory-made at moderate cost—and get prompt delivery.

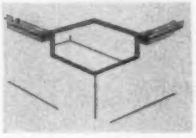
**DRILLING—**
or drilling and tapping—
of conduit entrances



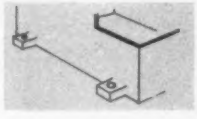
**BOSSES—**
to provide extra thickness
for five-thread conduit entrances.
Drilled and tapped to specification
if desired



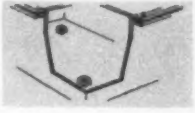
**SPECIAL GASKETS —**
Neoprene for fungus resistance in hot, humid climates • pure gum for extreme softness and resistance to special acids • Vellumoid for resistance to oils and fats • graphite-free compressed asbestos for installation near boilers or steam pipes



**MOUNTING LUGS—**
drilled for any desired
bolt size



**INTERIOR MOUNTING BUTTONS—**
—tapped blind
to specified centers



**AND . . .** you can order these custom modifications, as well as standard BOXES by HOPE, conveniently and quickly, through your local electrical distributor.

**• OUTLET BOXES AND FITTINGS • JUNCTION AND PULL BOXES • HINGED CABINETS • TERMINAL BOXES • EXPLOSION HOUSINGS**

# HOPE

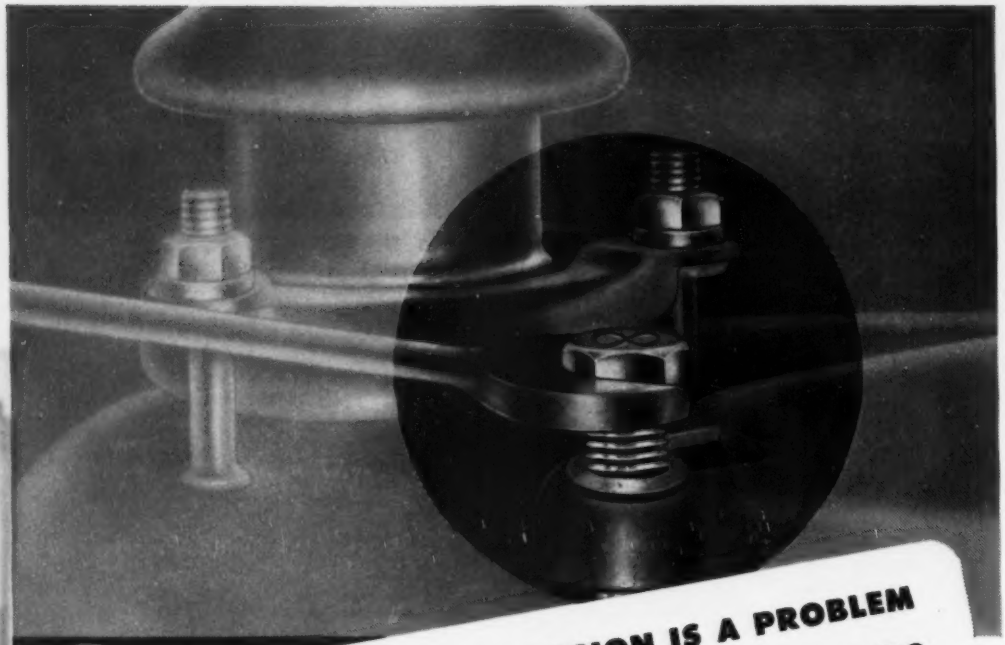
**ELECTRICAL PRODUCTS CO., INC.**

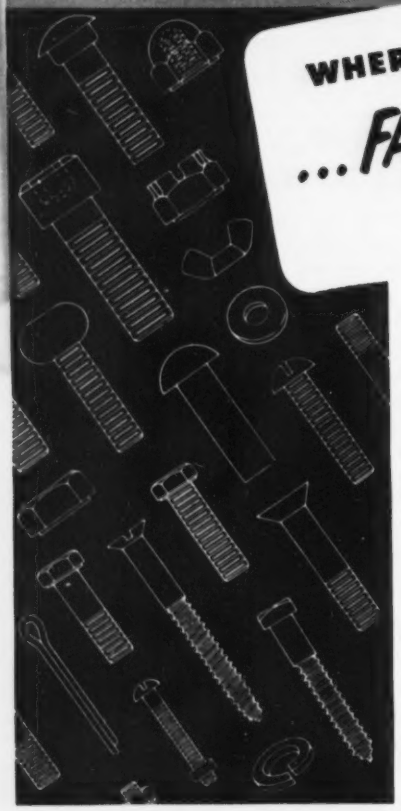
338 Wilson Avenue, Newark 5, N. J., Mitchell 2-4426

## EXPLOSION HOUSINGS BY HOPE

have been extensively used in Class 1, Groups C and D hazardous locations, such as chemical, petroleum and powder plants, pump rooms and paint plants.

**GET THE FULL STORY ON BOXES BY HOPE —**
**WRITE ON COMPANY LETTERHEAD FOR CATALOG**





## WHERE CORROSION IS A PROBLEM

# ...FASTENINGS by HARPER

## OFFER THE SOLUTION

Rain—snow—ice! Baking summer sun—bitter winter cold! Stress corrosion—electrolysis! These are all conditions that fastenings used by public utilities must meet.

Harper specializes in fastenings of alloys that will solve tough corrosion problems. Bolts—nuts—screws—rivets—studs—washers—cotter pins of brass, naval bronze, silicon bronze, Monel, nickel, stainless steel, aluminum.

Back of this company are 29 years of experience in meeting and solving tough fastening problems. Today, Harper is the largest company devoted exclusively to the manufacture of fastenings of non-ferrous metals and stainless steel. Harper engineers and metallurgists are ready to assist you in the solution of any fastening problems you may face. For better fastenings, call The H. M. Harper Company, 8205 Lehigh Ave., Morton Grove, Illinois.

There is a Harper distributor near you with stocks of fastenings ready to fill your order. Call him for prompt service.

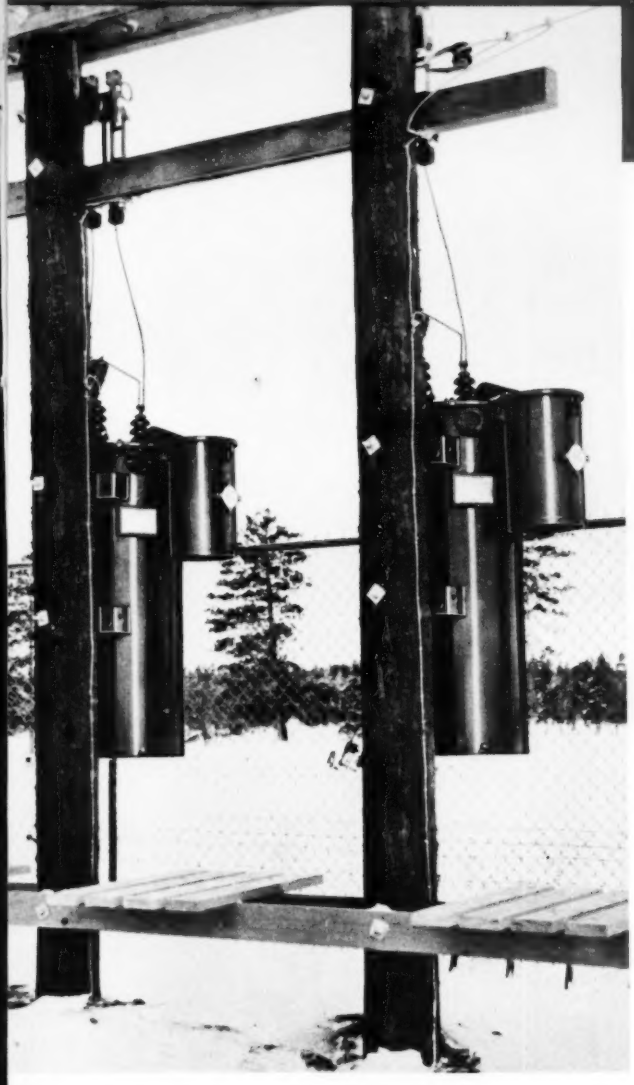
HARPER

EVERLASTING FASTENINGS

*Specialists in all non-corrosive metals*

# The Only 32-Step Distribution Regulator

*with 8 Years of Proved Accuracy and Reliability!*



**ALLIS-CHALMERS**
**5/8% STEP VOLTAGE REGULATORS**

*Plus*

- ★ **Simple, Low-Cost Maintenance**
- ★ **Fast Installation**
- ★ **Low Initial Cost**

ALLIS-CHALMERS DISTRIBUTION REGULATORS will give you years of reliable voltage regulation. Field application to all kinds of line conditions during the past eight years has proved the value of this low-cost, reliable regulator.

It will pay you to consider Allis-Chalmers distribution regulators for every voltage application. Read the next three pages for some of the reasons.

A-3797

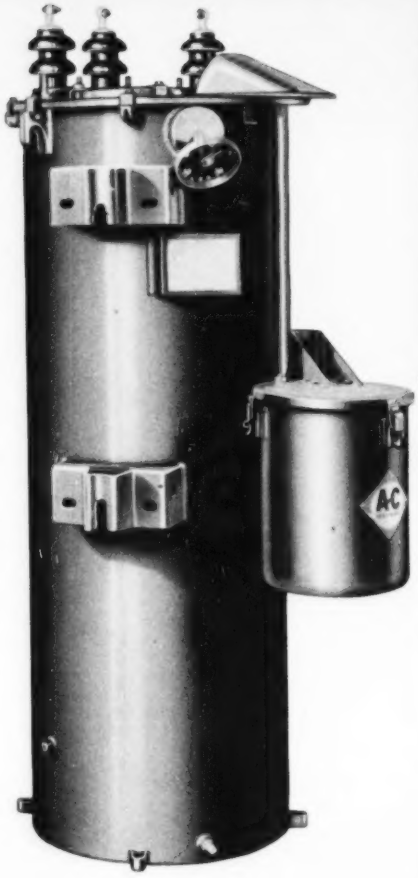
**ALLIS-CHALMERS**

*Originators of 5/8% Step Regulation*

# ALLIS-CHALMERS

# Distribution Regulators

## *Give Reliable, Accurate Regulation*



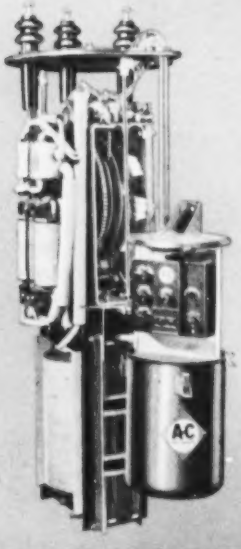

**The Allis-Chalmers distribution regulator** is the end result of twenty years of 5/8% step regulator design and manufacture. And the distribution regulator itself has been in field operation for eight years. No other step voltage regulator now on the market can match its combination of proved service life and high quality features of regulation. Some of these features are described on these pages.

When Allis-Chalmers distribution regulators are on your system, you get a narrow ± 1 volt band, thirty-two small 5/8% steps, 20% range of regulation, easy control adjustment, close average voltage maintained by voltage integrator and long life unit construction.

Best of all, the initial cost is low. And simplified installation and maintenance make operating costs low too.

For every voltage application, the Allis-Chalmers distribution regulator will cut costs and increase profits. Read about all the advantages you get with these low-cost units and find out how Allis-Chalmers distribution regulators will improve your system's service.

## Designed and Built for Application

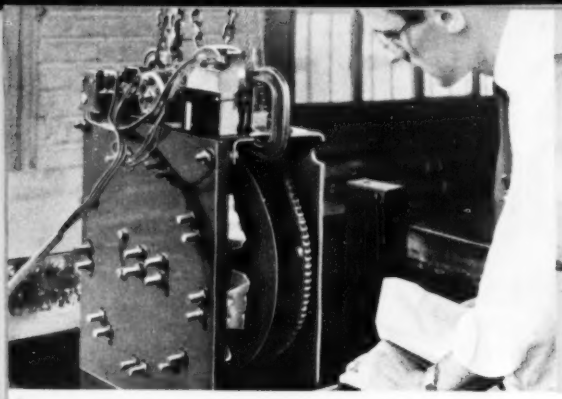


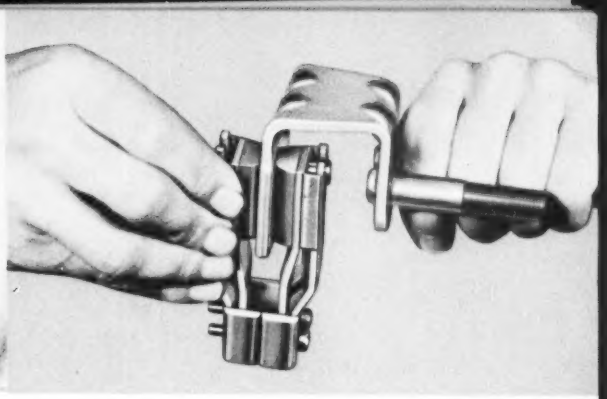

### *Unit-Type Construction Increases Reliability*

**All Allis-Chalmers regulators** employ unit-type construction. The transformer, tap-changing mechanism, and control are cover-suspended. All connections are made before the unit is tanked.

High quality workmanship and thorough inspection are guaranteed because the unit is easily accessible before tanking. Any future inspection is made simple because it is possible to untank the unit without disconnecting leads or removing terminals. To remove the unit from the tank, just remove the cover bolts and handhole cover and lift it out. A separate source can be connected to the control and the regulator operated electrically.

Tap leads are brazed to the main coil and run directly to the double bolts of the stationary contacts, as the picture at left shows.





# *Exhaustive Life Tests Prove You Get Many Years of Accurate, Trouble-Free Voltage Regulation*

**5,000,000 OPERATIONS** . . . equivalent to 100 years of normal service life. That's the record made by the tap-changing mechanism of an Allis-Chalmers distribution regulator in life tests.

Tap-changing mechanisms are designed for simplicity, built for rugged operation. For example, there are only three main mechanical bearings and many parts have been unitized. All nuts and bolts are securely locked for maintenance-free performance.

| RATINGS AVAILABLE | 7620 Volts—15, 50, 100 amp |
|---|---|
| | 5000 Volts—50, 100 amp |
| | 2500 Volts—100, 200 amp |

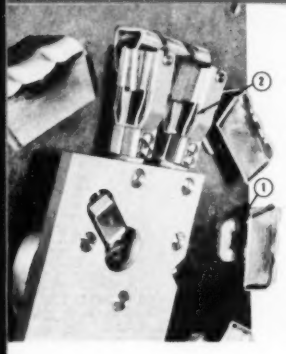
**TRY TO PULL THESE CONTACTS** against the spring pressure! Allis-Chalmers regulators give you contact pressure so strong you needn't worry.

These contacts give you greatest possible pressure without sacrificing tap-changing power or cushioning effect. This is one of the benefits you get from Allis-Chalmers 20 years of ⅝% step regulator experience.

Arc-resisting material and large dimensions give greater current capacity which adds to contact life. That's one reason why Allis-Chalmers distribution regulator contacts withstand 2,000,000 operations — equal to 40 years of normal service life.

★ ★ ★

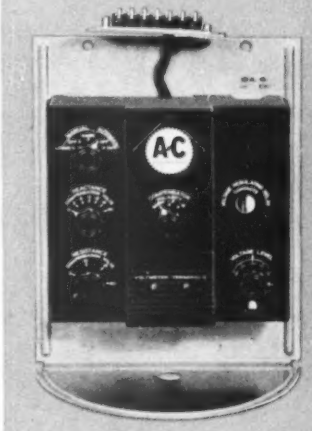
# to Every Voltage Regulation Problem




**STATIONARY CONTACTS** are one piece and have induction welded mounting studs to eliminate a bolted connection. (1) Three piece moving contacts are equipped with a driving arm (2) to take strain off spring and allow contact pressure to remain high.

**NEW SIMPLIFIED CONTROL** provides calibrated voltage level for easy adjustment. Voltage level is only adjustment you make because voltage band is preset at the factory. Allis-Chalmers famous "Feather Touch" control holds contact arcing to a minimum, eliminating need for holding coils and their complicated adjustment. A new double cantilever suspension on the regulating relay increases accuracy and extends service life of the relay. The entire control panel can be removed and replaced simply and fast, for calibrating or adjustment in the shop. A single jack plug disconnects all wiring.

**POSITION INDICATOR** shows percent of raise and lower, is equipped with drag pointers to show operating range of regulator. Drag pointers are easily reset. Accurate reading of indicator is assured by a direct mechanical drive and slotted shaft that guarantees positive alignment with tap changer. Position indicator is supplied on units over 50 amps.



# Fast, Simple Maintenance

**Whether your Allis-Chalmers distribution regulators** are mounted on poles or closer to the ground, you'll find that maintenance is fast and low-cost. Allis-Chalmers twenty years of designing 5/8% step regulators pays off in a simple design that doesn't sacrifice accuracy or reliability.

### *CONTROL IS QUICKLY REPLACED*

The control is a good example. To check it, just flip the cover hasps and drop the control housing to mechanical stops. If service is needed, your lineman can replace the entire control with a spare in a few minutes. The only connection is a jack plug.

Your linemen don't have to be technical specialists because the control can easily be returned to the shop for a thorough check-up. Best of all, your regulator isn't out of service during the check-up.

### *UNTANKING IS EASY*

To untank the regulator, just remove the cover bolts and handhole cover and lift the transformer and tap-changing mechanism out of the tank. No connections to break, no terminals to remove, no oil to handle.

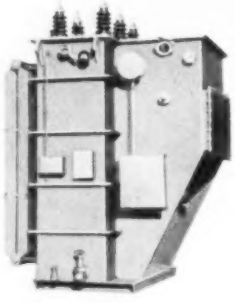
## *Get These Features On All*

**ALLIS-CHALMERS 5/8% STEP VOLTAGE REGULATORS**

1. 5/8% Steps
2. Close Regulation ( ± 1 volt band)
3. Easy control adjustment. The same type of control used on all sizes.
4. Close average voltage (maintained by voltage integrator).
5. Long life contacts of liberal design to withstand hundreds of thousands of operations.
6. Tap-changing drive mechanism with balanced spring action to eliminate shock . . . operates under oil for long trouble-free life.
7. Unit construction to simplify your maintenance requirements.

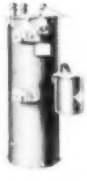
*Call your nearest A-C district office for more information, or write:*

**Allis-Chalmers Manufacturing Company**
**General Machinery Division**
**Milwaukee 1, Wisconsin**



Station Type Three Phase Regulator

Station Type Single Phase Regulator



Distribution Regulator

# ALLIS-CHALMERS

**Originators of 5/8% Step Regulation**

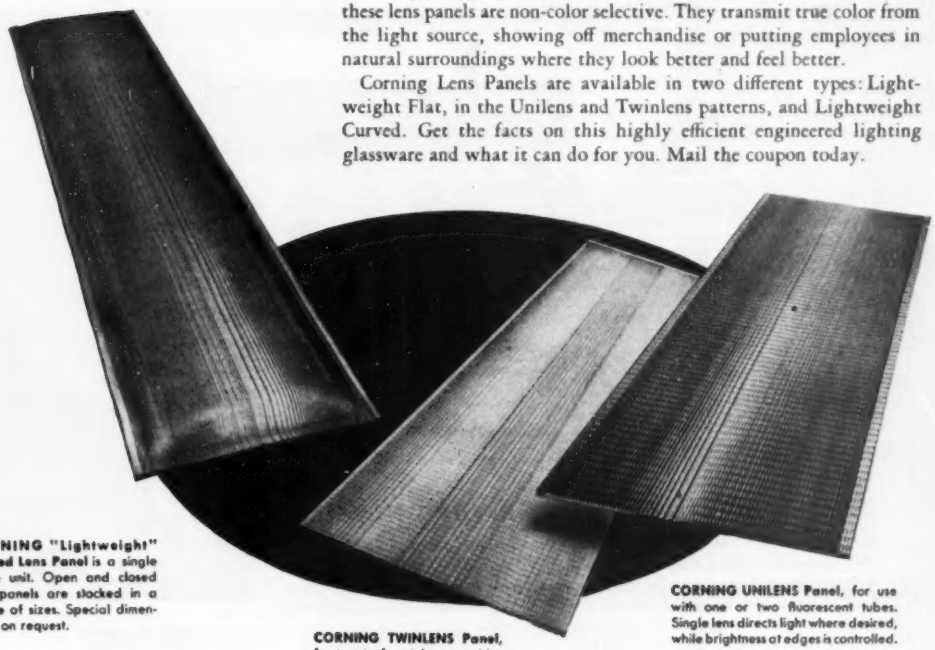
# CORNING LENS PANELS

## Put the *right* light where it is needed

Here's how you can give your customers smooth, evenly distributed light with carefully controlled brightness. New Corning Lens Panels with Fresnel design lenses eliminate shadow and glare—direct light where it is needed.

Light in weight and easy to handle, Corning Lens Panels are made in long lengths, making possible attractive, continuous runs with a minimum of unsightly butts and light leakage. Their light weight also keeps shipping, fixture, and installation costs low. What's more, these lens panels are non-color selective. They transmit true color from the light source, showing off merchandise or putting employees in natural surroundings where they look better and feel better.

Corning Lens Panels are available in two different types: Lightweight Flat, in the Unilens and Twinlens patterns, and Lightweight Curved. Get the facts on this highly efficient engineered lighting glassware and what it can do for you. Mail the coupon today.



**CORNING "Lightweight" Curved Lens Panel** is a single piece unit. Open and closed end panels are stocked in a range of sizes. Special dimensions on request.

**CORNING TWINLENS Panel,** for two to four tubes, provides high lighting efficiency. Fluted rear surface intercepts light, prevents transmission of lamp image.

**CORNING UNILENS Panel,** for use with one or two fluorescent tubes. Single lens directs light where desired, while brightness at edges is controlled.

**CORNING GLASS WORKS**
**CORNING, NEW YORK**
*Corning means research in Glass*

**CORNING GLASS WORKS, Dept. EW-9, Corning, N. Y.**

Please send me your Catalog LS-32 "Corning Glassware for Fluorescent Lighting."

Name_____ Title_____

Firm_____

Address_____

City_____ Zone_____ State_____

**TESTS TEN TIMES GREATER THAN NORMAL!**

Your lines are never likely to experience loads such as Porcelain Products Suspension Insulators are put through in gruelling tests to prove their stamina. Recent time-load tests on our Suspension Insulators for one of the large Utility companies followed the current NEMA Standards pattern up to the application of the 10,000 pound load. The **really gruelling test** went on from that point for a period of ten days as compared to the standard of 24 hours. Every day the standard flash-over with the 10,000 pound load still applied was made. At the end of the time-load test each insulator was given the standard 15,000 pound combined M&E test, passing without failure. You can count on Porcelain Products Suspension Insulators giving maximum performance on your line.

**Porcelain Products, Inc.**

PARKERSBURG, WEST VIRGINIA

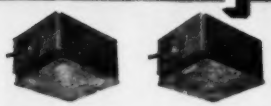
# Guth

## the complete line of fluorescents and incandescents

When you specify GUTH Luminaires, you get the benefit of more than a half-century's experience in pioneering better lighting. We make good specialized equipment for every lighting need... all *precision-planned* for economical installation and maintenance:

**FLUORESCENT:** Commercial and Industrial; Glass diffused, Eggcrate shielded, totally indirect, luminous indirect, recessed troffers and exposed lamp types.

**INCANDESCENT:** Commercial and Industrial; indirect, direct and semi-indirect types; also high bay reflectors, exit and utility lighting units.



**"ALL-SQUARE"** ...for recessing. One-piece die-cast frame. Light-leakproof. Widespread or concentrating lens... sizes 6½" sq., 8" sq. & 12" sq. PRE-WIRED. Removable top, and drop hinge bottom for servicing from above or below. Catalog 49.

▲ "ALL-SQUARE"

**SEELUX** ... totally indirect open bottom Luminaire for for Silver Bowl Lamps, with modern ALZAK concentric louvres; for stem suspension or close mounting. Bulletin 864.

▲ SEELUX®

**ARISTOLITE** ...hinged glass panels swing open for easy cleaning from floor with handy servicing tool. Also with center Eggcrate louvres. For 2, 3 or 4 40-watt or 2 or 4 4-ft. SLIMLINE lamps; ceiling or suspension, unit or continuous mounting. Write for Bulletins 812 and 820.

▲ ARISTOLITE®

**NEW FUTURLITER** ...with GUTH GRATELITE* the 48" long plastic louvre with 45 x 45 cut off for efficient vertical illumination and low brightness diffusion at angles above 45°. GRATELITE is made in sizes up to 48" long. Easy to install on single fixtures or complete ceilings. Available in opaque or transparent densities. Send for information.

*Patent Pending

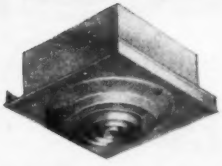
▲ NEW FUTURLITER®

**TRUCOLITE** ...versatile, highly efficient, semi-direct type; can be used open, with Eggcrate louvres or diffusing glass bottom. For 2, 3 and 4 40-watt lamps...also 2 and 4 4-ft. or 8-ft. SLIMLINE lamps. Ceiling or suspension, unit or continuous mounting. Bulletins 814 and 852.

▲ TRUCOLITE®

**GUTHLITE** ... the revolutionary "Jacknife" Hinge Luminaire that swings down for easy relamping or cleaning right from the floor! For 2 40- or 2 85-watt or 2 4-ft. SLIMLINE lamps; ceiling or suspension, unit or continuous mounting. Simplest fixture to install. Bulletin 845.

▲ GUTHLITE®



**HY-LITERS** ...recessed and surface types for PAR 38. Adjustable 45° from vertical in all directions. Can be used as individual units, or in conjunction with our fluorescent types. Bulletin 834.

▲ HY-LITERS

**WYTE-LINER** ...white inside and outside (takes gloom off ceiling). AIRFLOW channel for longer ballast life. Reflectors 300° Permalux or Porcelain Enamel. Made in 2 and 3 40-watt, 2 85-watt, and 4- and 8-ft. SLIMLINE lamps. Easy to install and clean. Catalog 48.

▲ WYTE-LINER

**"LITE-BLOX" RECESSED TROFFERS** ... for 1, 2, 3 or 4 lamps: 20-, 40-, 85-watt, or 4-ft., 6-ft., or 8-ft. SLIMLINE. Exclusive end KO's provide exact 48.0"; modular design for unlimited patterns. Wide variety of shielding and diffusing glass panels available; also ALZAK reflectors if desired. Bulletin 869.

▲ "LITE-BLOX" RECESSED TROFFERS

**GUTH 4-FT. SLIMLINE** available in every GUTH fluorescent fixture

- no starters or starter troubles!
- easy to handle Single-Pin lamps!
- light in two steps almost instantly!

## THE EDWIN F. GUTH CO. / ST. LOUIS 3, MO.

# INSTALLED 1942

*It has an Unmatched Field Performance Record of Trouble-Free Service!*

This C-D 20,160 Kvar capacitor bank installed by a major northwestern power producer in 1942, has an outstanding record for low-maintenance operation. Another typical time-tested C-D installation!

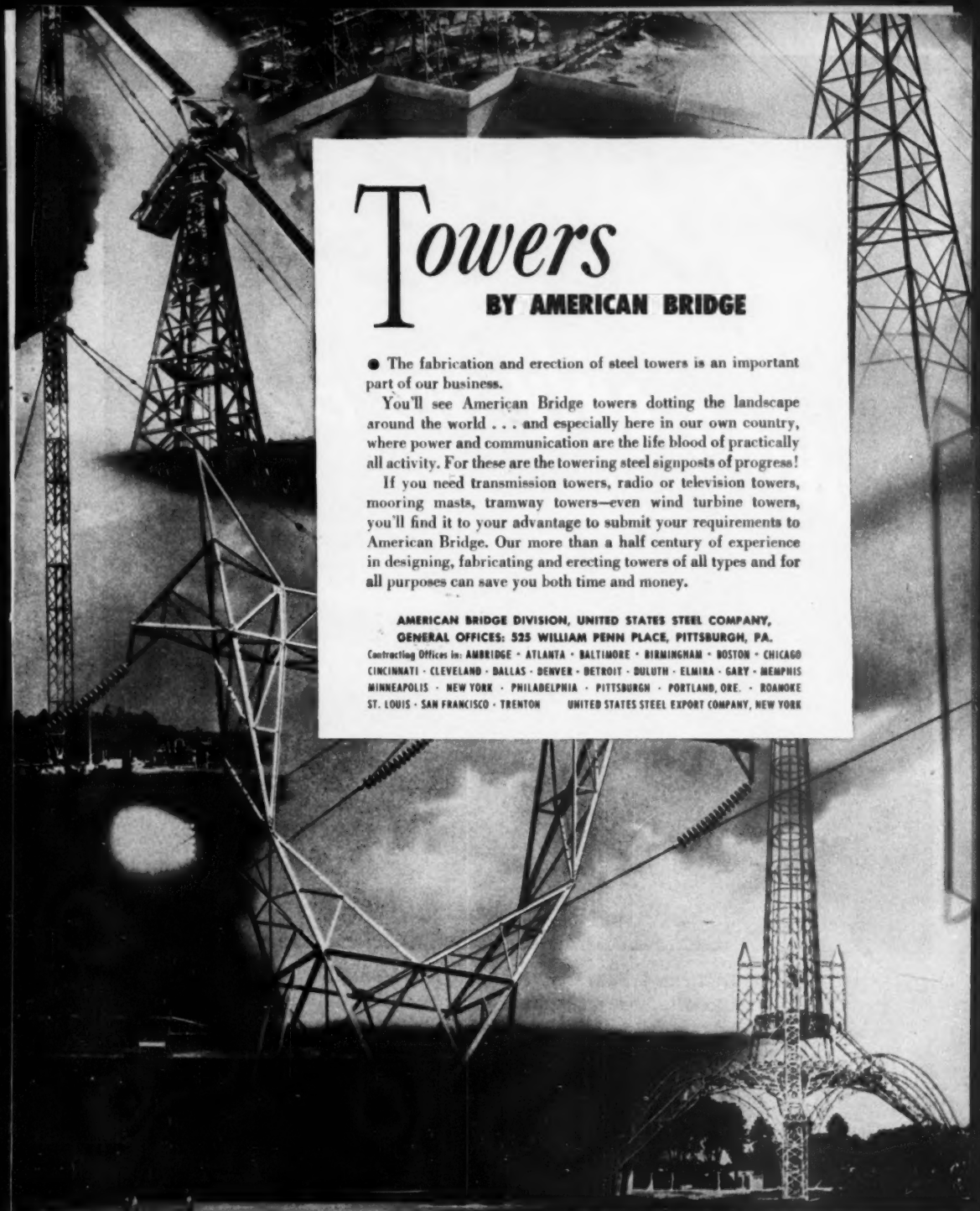
Ask to have a C-D engineer point out the low-maintenance characteristics that are built into every C-D capacitor. Cornell-Dubilier Electric Corp., Dept. D-92, South Plainfield, N. J.

**CORNELL DUBILIER**

CONSISTENTLY DEPENDABLE

**CAPACITORS**

PLANTS IN SO. PLAINFIELD, N.J. • NEW BEDFORD, WORCESTER AND CAMBRIDGE, MASS. • PROVIDENCE, R.I. • INDIANAPOLIS, IND. • FUQUAY SPRINGS, N.C. • SUBSIDIARY, RADIART CORP., CLEVELAND, O.



# Towers
## BY AMERICAN BRIDGE

● The fabrication and erection of steel towers is an important part of our business.

You'll see American Bridge towers dotting the landscape around the world . . . and especially here in our own country, where power and communication are the life blood of practically all activity. For these are the towering steel signposts of progress!

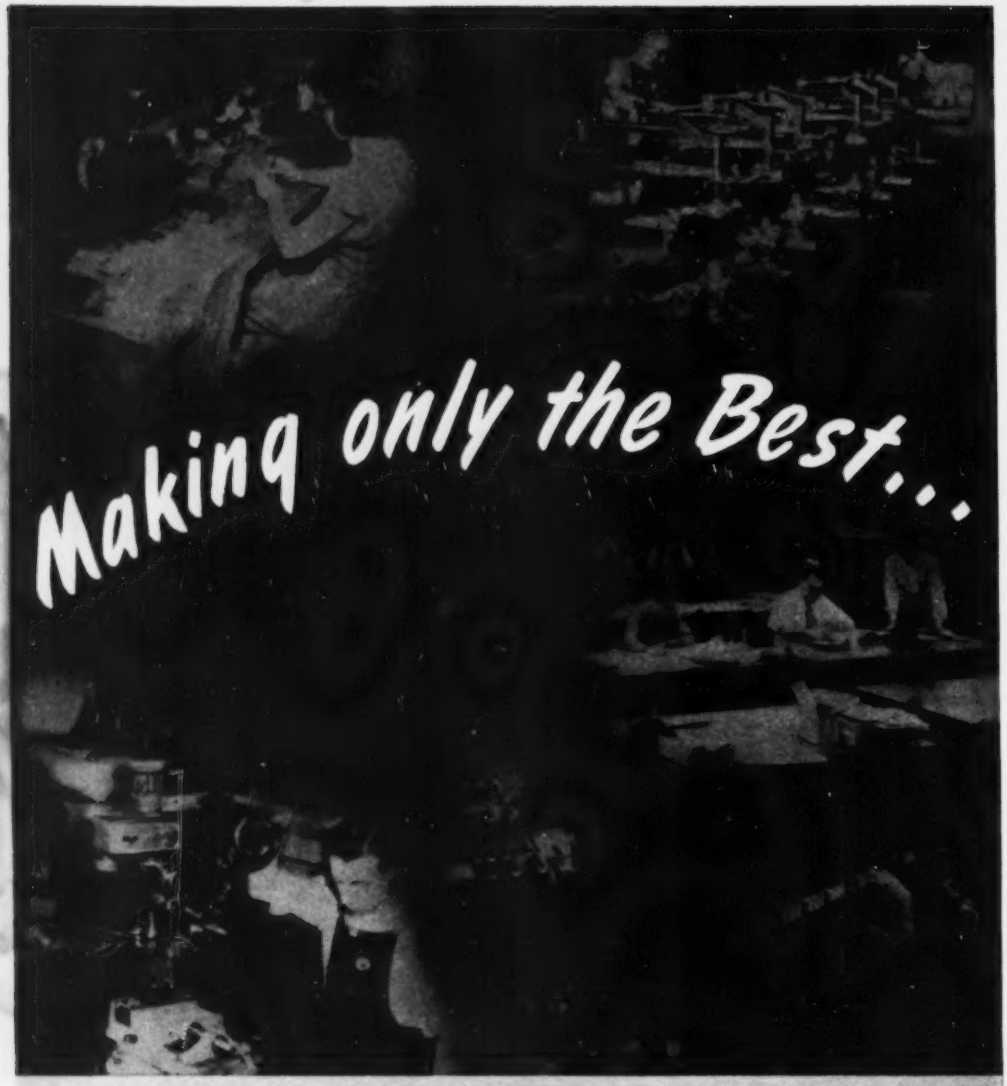
If you need transmission towers, radio or television towers, mooring masts, tramway towers—even wind turbine towers, you'll find it to your advantage to submit your requirements to American Bridge. Our more than a half century of experience in designing, fabricating and erecting towers of all types and for all purposes can save you both time and money.

**AMERICAN BRIDGE DIVISION, UNITED STATES STEEL COMPANY,**
**GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.**

Contracting Offices in: AMBRIDGE · ATLANTA · BALTIMORE · BIRMINGHAM · BOSTON · CHICAGO CINCINNATI · CLEVELAND · DALLAS · DENVER · DETROIT · DULUTH · ELMIRA · GARY · MEMPHIS MINNEAPOLIS · NEW YORK · PHILADELPHIA · PITTSBURGH · PORTLAND, ORE. · ROANOKE ST. LOUIS · SAN FRANCISCO · TRENTON UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

# AMERICAN BRIDGE
UNITED STATES STEEL

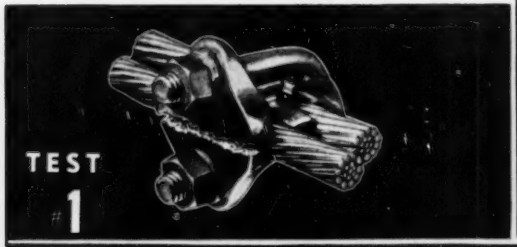


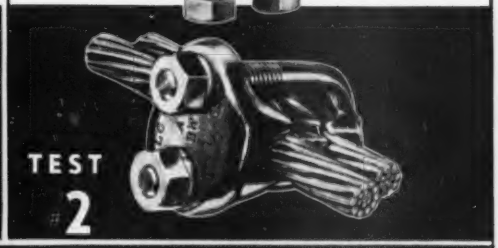

Oil and Air Circuit Breakers • High and Low Voltage Switchgear
Unit Substations • Instruments • Precision Balances
Watthour Meters • Disconnect Switches • Outdoor
Hook Stick Switches • Air Break Switches
Indoor and Outdoor Bus Supports
Bus Ducts • Substations

ROLLER-SMITH
CORPORATION
AND ELPECO DIVISION
BETHLEHEM, PENNSYLVANIA

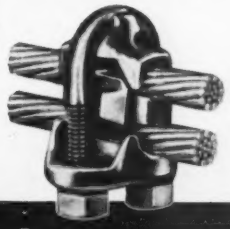
# Semblance of Design DOES NOT Prove Equal Quality!

For Continuity of Service *Be Sure by Test* Aluminum Clamping Members Have Greater Strength than Hardware Components




**Aluminum Distribution Connector Assembled with Maximum Size Cables in Both Grooves.**



**TEST STANDARD: 500 Inch Pounds Minimum Torque for 3/8 inch Diameter "U" Bolts.**

**TEST #1 Conducted on CONNECTORS of OTHER MANUFACTURE**
Torque: *Below* minimum test standard applied in several tests caused deformation or fracture of clamping members and failure of 3/8 in. "U" Bolts.

**TEST #2 Conducted on ABW CONNECTORS**
Torque: *Above* minimum test standard applied in all tests caused no failures of 3/8 in. "U" Bolts and no deformation or fracture of clamping members.

**EXAMINATION OF CONNECTOR COMPONENTS THAT FAILED IN TEST NO. 1 REVEALED:**

- IMPROPER OR NO HEAT TREATMENT OF CASTINGS
- POROSITY AND IMPURITIES IN METAL
- COLD RUN OF METAL DURING CASTING PROCESS
- IMPROPER ALLOY USED

*Be Sure* Buy Aluminum Connectors, Clamps, Fittings and Accessories backed by more than *25 Years* of Electrical, Mechanical and Metallurgical Knowledge and Manufacturing Experience gained in Meeting and Maintaining the most Exacting Standards of the Electrical Industry.

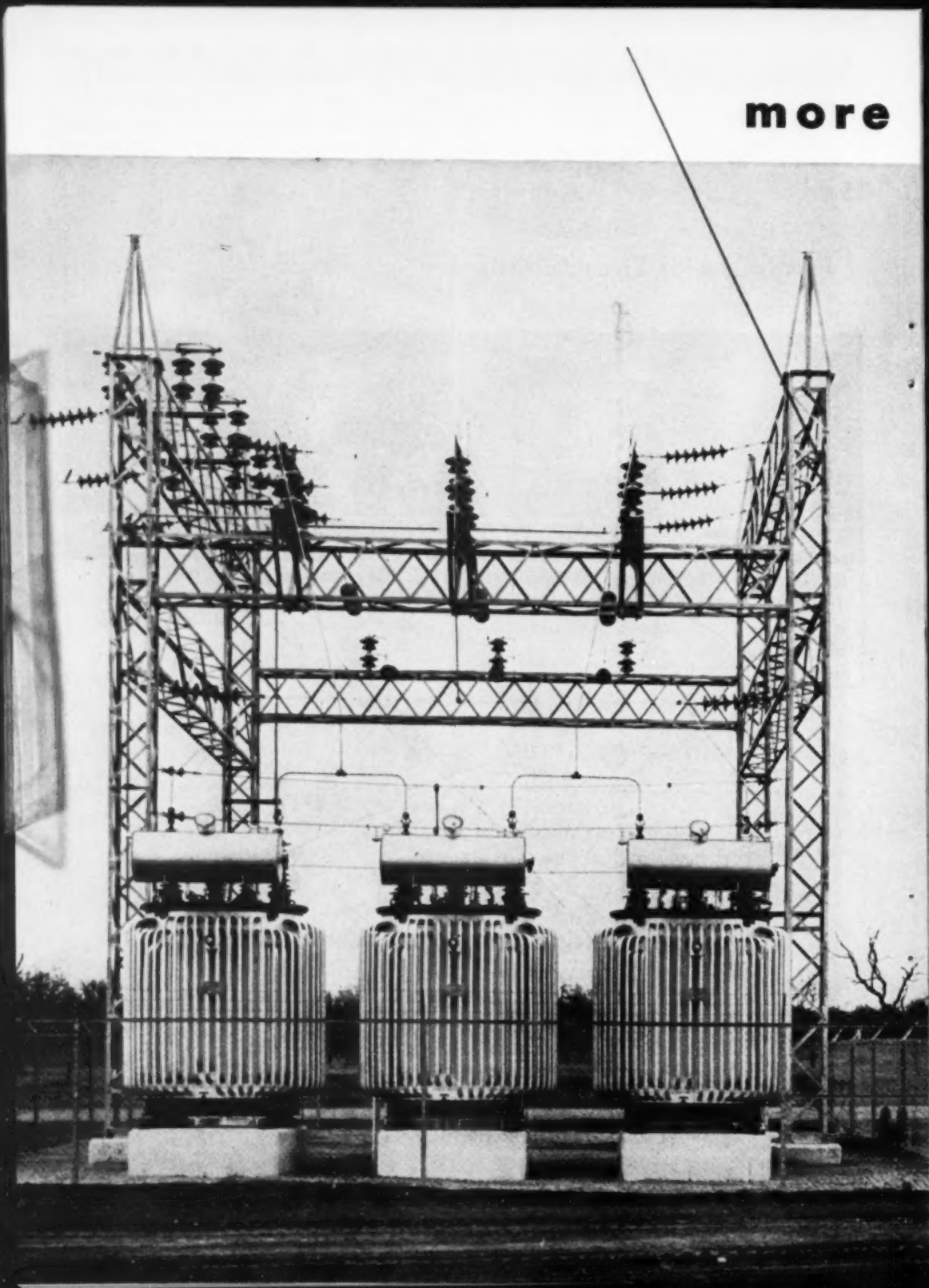
**OUR PRODUCTS ARE QUALITY CONTROLLED FROM INGOT TO FINISHED PRODUCT**

CONSULT ONE OF OUR NEAREST EIGHTEEN REPRESENTATIVES OR CONTACT OUR MAIN OFFICE

**ANDERSON BRASS WORKS, Inc.**

POST OFFICE DRAWER 2151

*Aluminum* BIRMINGHAM, 1, ALABAMA *Bronze*


more

# power for Texas oil

A big industry like the oil industry needs reliable equipment. That's where Kuhlman comes in. These three Kuhlman Power Transformers—each 1500 KVA, single phase, rated at 69 KV—are part of the pumping system of one of the world's largest pipeline companies, located in Texas.

This company, along with many other transformer users, knows that the name Kuhlman represents 58 years of expert engineering and solid construction.

It is significant that Kuhlman, a pioneer in transformer manufacture, continued to find ways to improve an already highly standardized product. Many of these improvements are now standard.

Whenever you have a transformer requirement—large or small—call the Kuhlman representative in your vicinity. If you don't have his address, write us.

Kuhlman

**KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN**

*The complete Kuhlman line includes power, distribution, dry type, Saf-T-Kuhl, and specialty units. Write today for descriptive bulletins. For information on power transformers, ask for Bulletin CS-601.*

**EXPORT REPRESENTATIVES:** *International Standard Electric Corporation,* 67 Broad Street, New York 4, N.Y. Cable Address, Microphone, N.Y.

# This rolling workshop is tops with servicemen

**Here are just a few** of the reasons why servicemen prefer the Internationals with service-utility bodies:

The bodies are of all-steel construction, electrically welded into one complete unit. Compartment doors are dust and moisture resistant with chain stops, flush-mounted door handles. All shelves and trays have safety-rolled edges.

There's a wide range of International Trucks to choose from. See your International Truck Dealer or Branch—today!

**INTERNATIONAL HARVESTER COMPANY · CHICAGO**

International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

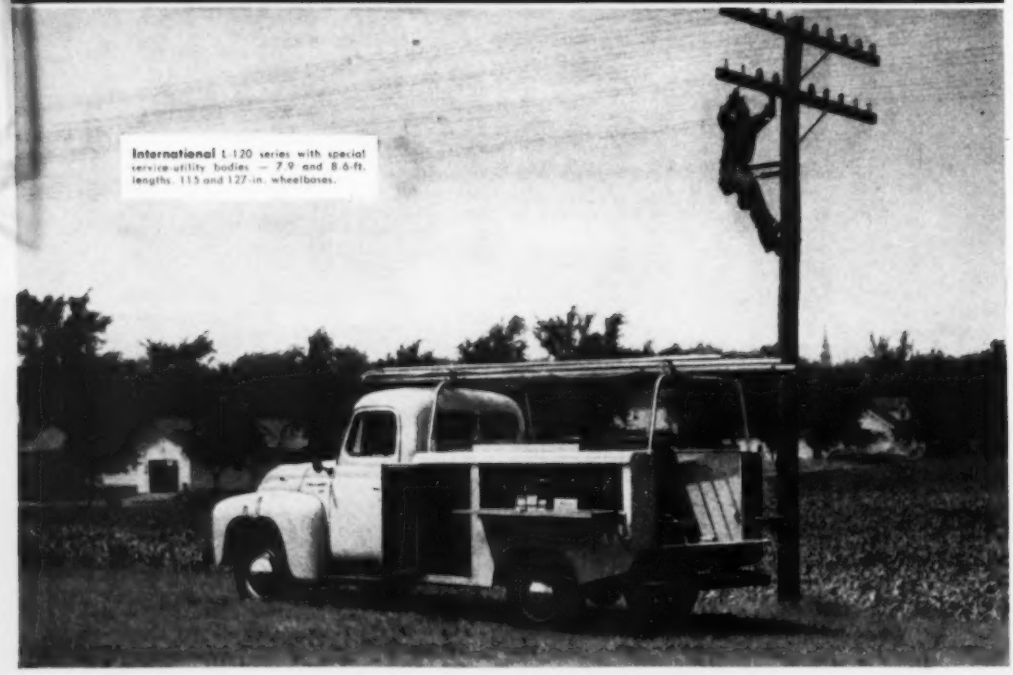
**Look for these International Truck exclusives:**

- Silver Diamond valve-in-head truck engines are rugged, packed with extra power. Engineered to save you plenty on operating and maintenance costs.
- New green-tinted, non-glare safety glass available in Comfo-Vision Cab. One-piece, full-vision windshield.
- Super-steering system — more positive control. Wider front axles make possible full 37° turning angle for easier handling and maneuverability.
- Wide variety of light-duty models — ½, ¾, and 1-ton sizes—GVW's from 4,200 to 8,600 lbs. 115, 127, 134-in. wheelbases. Panel, pickup, stake and many other types of bodies.

*Better roads mean a better America*

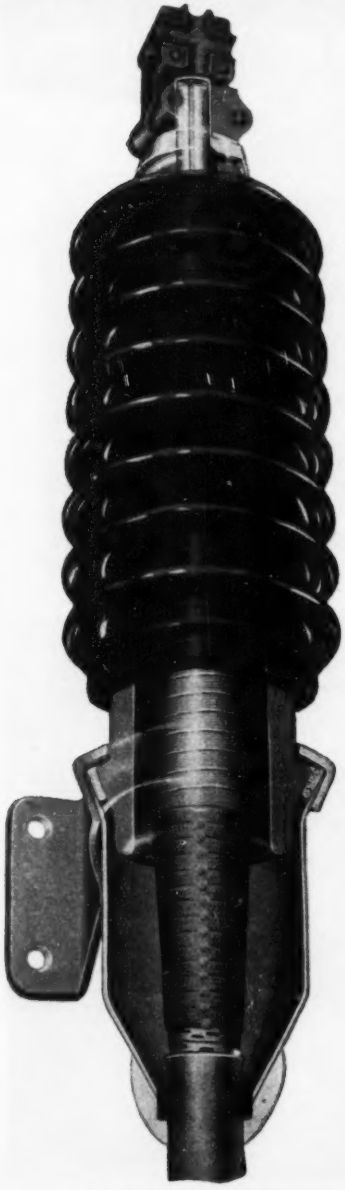
# INTERNATIONAL TRUCKS

"Standard of the Highway"



**International** L-120 series with special service-utility bodies — 7.9 and 8.6-ft. lengths. 115 and 127-in. wheelbases.

# STRESS RELIEF CONES



*improve the electrical characteristics of high voltage cable terminations*

**Stress relief cones reduce the unit electrical stress in the cable insulation at the end of the grounded sheath. They increase the overall internal dielectric strength and reliability of the cable termination.**

**Stress relief cones are recommended for all shielded cables and particularly for single conductor lead-covered and three-conductor shielded cables operating at 12 Kv. and higher voltages.**

**For compound-filled potheads on paper or varnished cambric insulated cables, a double cone is built up of half-lapped varnished cambric tape. The lower slope is wrapped with copper tinsel braid, tucked under the bell at end of lead sheath and soldered to the lead sheath and/or to the cable shielding tape. *On rubber insulated cables use Nozone rubber tape and TINNED copper tinsel braid.***

**For gas and oil filled potheads, insulating tape is applied OVER the ordinary stress cone to compensate for the absence of solid compound and provide the necessary electrical strength.**

Specify and order G & W POTHEADS with stress relief cone material in unit package kits. **The correct amount of proper tape and shielding braid is supplied in convenient form — clean, dry and ready for use. Varnished cambric tape and coppper tinsel braid is oil packed in sealed cans.**

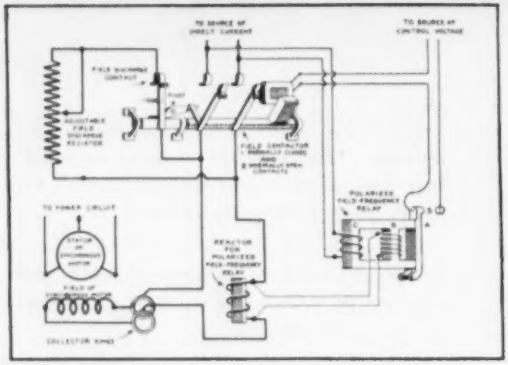
**G & W furnishes dimensions and instructions for stress relief cone installations, when requested on orders for potheads.**

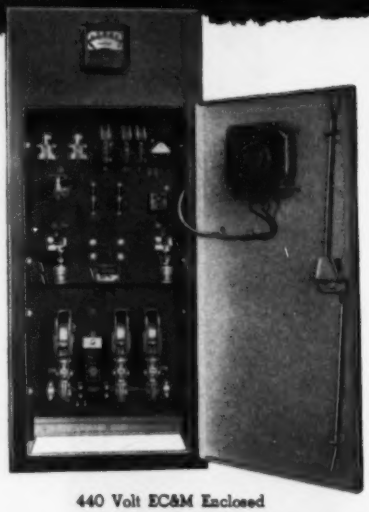
***Send for Bulletin No. A52 which explains the theory of stress relief cones in potheads, and lists prices of unit kits for cables of various kinds and sizes.***

**G & W ELECTRIC SPECIALTY COMPANY**
7780 DANTE AVENUE • CHICAGO 19, ILLINOIS, U.S.A.
*Representatives in principal cities. In Canada, Powerlite Devices, Ltd., Toronto*

# EC&M SYNCHRONOUS STARTERS

## with Automatic Field Application by Polarized Field-Frequency Relay





440 Volt EC&M Enclosed Synchronous Starter

***Push Button Start*** **brings motor up to speed automatically. Motor pulls into step *without delay*. Automatic Field Removal if motor slows down on voltage dips or overload. Field automatically re-applied when load re-accelerates.**

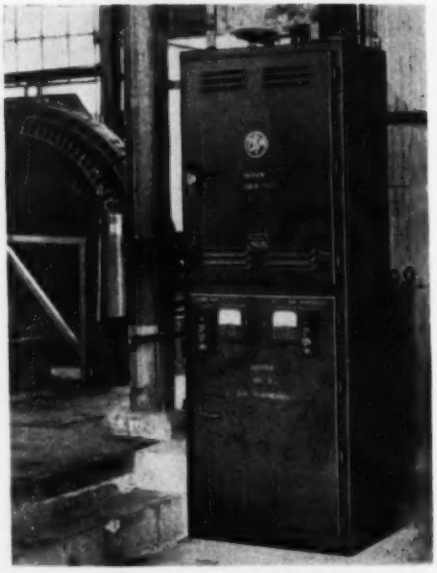
★★★

With greater skill than human hands could do it, EC&M Push Button Magnetic Starters provide completely automatic operation of synchronous motors.

At about 95% synchronous speed, the motor is pulled into synchronism. Full Field excitation occurs when the rotor and stator poles are most favorable to locking into synchronism. This causes synchronization to occur without pole slippage, with minimum line current and greatest synchronizing torque.

EC&M Synchronous Starters are built for both low and high voltages up to 4600 volts. They are of unit construction with all internal wiring complete. The cubicle types are totally enclosed and do not require an expensive control room. They may be mounted alongside the motors they control.

***Write for No. 21 ACCELERATOR and Bulletins 1075, 1076, 1077 and 1078***



2300 Volt EC&M VALIMITOR Starter for Steel Mill Air Compressor

**THE ELECTRIC CONTROLLER & MFG. CO.**

2698 EAST 79TH STREET • CLEVELAND 4, OHIO

# National Engineering Research finds the *economical* solution

## *The problem:*

**to insulate a 5 kilovolt, 1500 ampere bus bar installation**

Recently I-T-E Circuit Breaker Company of Philadelphia had the problem of *completely* insulating 5 kilovolt, 1500 ampere 3 phase bus bar units for an Atomic Energy Commission installation. It was simple enough to insulate the bus bars with oval Phenolite tubing. But, to completely insulate the bus supports and expansion joints was a real problem. I-T-E's engineers showed us what they wanted . . . postformed Phenolite insulating covers . . . drawn deeper than anything we had ever attempted. Our engineers tackled the problem.

## *The solution:*

**Phenolite Grade X-114A postforming material and National's technical "know how" in the design of forming dies**

Perhaps *your* problem doesn't involve the insulation of 5 KV, 1500 ampere bus bars. But maybe you have an insulating problem where National can give you some real help in solving how to do your certain job economically. Write us, our engineering service is immediately available.

**National Laminated Plastics**
**nationally known—nationally accepted**

PHENOLITE Laminated PLASTIC

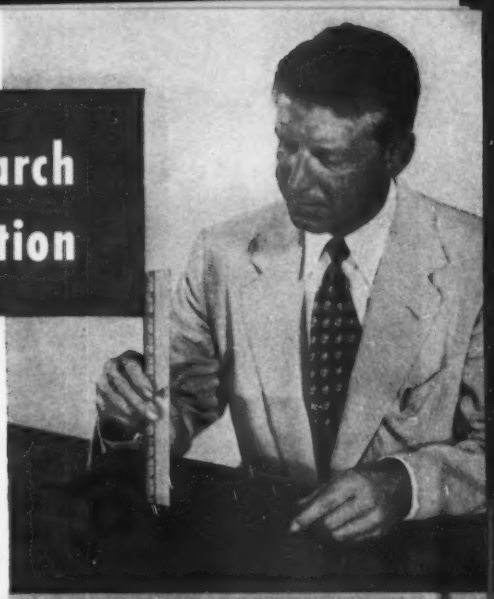
The perfect insulation material for high and low voltage applications, Phenolite possesses an unusual combination of properties. It has great mechanical strength and high resistance to moisture; ready machinability; is about one-half the weight of aluminum. Standard colors are natural, black, chocolate; mirror, semi-gloss and dull finishes. Sheets, Rods, Tubes, Special Shapes.

**National Vulcanized Fibre Company**

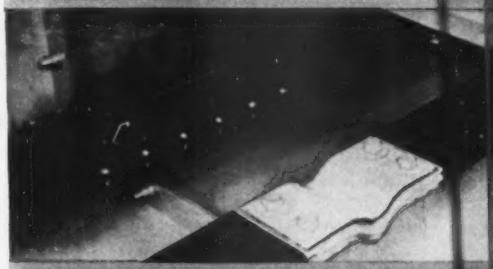
Wilmington Delaware

*Offices in Principal Cities*

Since 1873

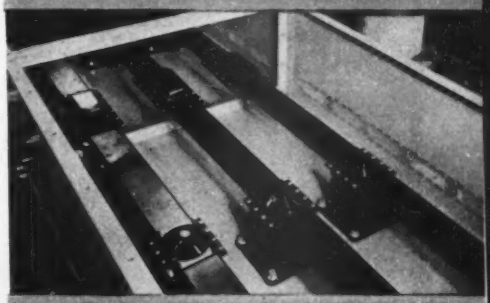


Phenolite postformed expansion joint cover.



Expansion joint with and without Phenolite insulating cover.

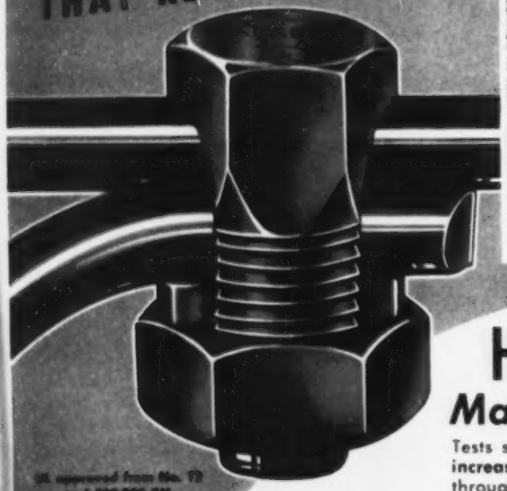
Bus support with and without Phenolite insulating covers.



Completed installation, showing Phenolite insulation for bus bars, supports and expansion joints.

# BLACKBURN *Hi-Strength* CONNECTORS

## MAKE HIGH PRESSURE Connections! THAT REALLY STAY TIGHT AND TROUBLE-FREE!



UL approved from No. 12 to 1,000,000 CM

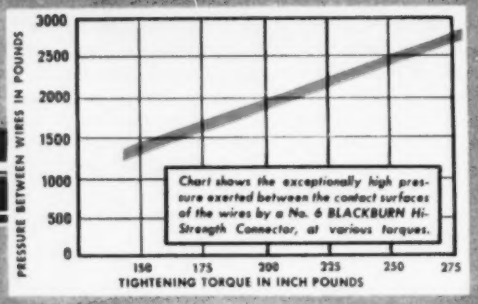



*Chart shows the exceptionally high pressure exerted between the contact surfaces of the wires by a No. 6 BLACKBURN Hi-Strength Connector, at various torques.*

## HIGH PRESSURE *Makes Better Connections*

Tests show that resistance **decreases** as contact pressure **increases**. Tests also show that high pressure will break through oxides and corrosion on the surface of the wire — particularly stranded wire — and make a better connection. And tests show that connectors which are capable of making high pressure connections definitely **stay tight** on the wires.

## BLACKBURN CONNECTORS MAKE LASTING HIGH PRESSURE CONNECTIONS BECAUSE:

1. They are made with the right combination of alloys — high strength alloys — to reduce frictional losses in the threads.
2. They are made with smooth-cut threads, to increase their efficiency. These two factors insure more of the tightening torque being converted to "pressure between wires."
3. Their corners and edges are all rounded, so that the high pressure cannot injure the wires.
4. They have that extra strength required to maintain the high "pressure between wires" without stretching and loosening.
5. The coefficient of expansion of the alloys used is substantially equal to that of copper. A temperature change of 100° F results in only 1% change in the "pressure between wires."

Yes, BLACKBURN Hi-Strength Connectors definitely make better connections — for your protection!

**JASPER BLACKBURN CORPORATION**
33 MADISON ST., ST. LOUIS 6, MO.
**Phone CEntral 3007**

**ENCLOSED UNITS TAKE CARE OF MOST INDUSTRIAL APPLICATIONS**—Two popular enclosed circuit breakers are these *general purpose* and *semi-dust-tight* designs. Others are: *flush mounting, water- and dust-tight* types. Automatic tripping is clearly indicated by the handle which assumes a position between the easy to see OFF and ON positions. No elements need be replaced to clear faults.

Enclosed breakers range in size from 15 to 600 amps where distribution of low-voltage current of 125 to 600 volts a-c or 125 to 250 volts d-c is required.

# For general purpose lighting and industrial power circuits

## A complete line of circuit breakers gives AUTOMATIC PROTECTION

Modern industrial plants everywhere are using a completely modern device to obtain overcurrent and short-circuit protection *automatically*. That device is the *circuit breaker*—a completely enclosed, non-tamperable unit that combines the functions of a circuit protection device and a switch.

To be sure they get the circuit breaker that exactly suits their requirements, many of these plants *specify Trumbull*—*complete* from 10 through 600 amps in double- or three-pole construction, and through 50 amps in single pole.

**INDIVIDUAL BREAKER UNITS HANDLE UP TO 600 AMPS**—Trumbull circuit breaker units are encased in rugged black molded phenolic, all with quick-make, quick-break toggle mechanisms that are *trip-free*. Higher ratings (over 100 amps) all use interchangeable thermal-magnetic trips adjustable over a wide range of current without affecting thermal trip points.

**TYPE TQL PLUGS INTO LOAD CENTERS AND PANELBOARDS.** It's the first plug-in circuit breaker made that's *quick-make, quick-break* and is the unit used in the new Trumbullite load centers, Trumbullite panels, and NLTQ panelboards. A thermal-magnetic breaker, the TQL stays-in for harmless temporary overloads, trips out *with a time-delay* on excessive overloads—*instantaneously* on short circuits. Ratings: 10, 15, 20, 30, 40 and 50 amps; single-pole, 125 volts a-c. Non-plug-in Type TQ breaker with solderless connectors is available in the same ratings as the TQL and is ideally suited for panelboard installations.

Remember, Trumbull Circuit Breakers are *non-tamperable units* that can cut down on your production delays by assuring faster clearing of overloads and short circuits.

***Write for descriptive bulletins on Trumbull Circuit Breakers***

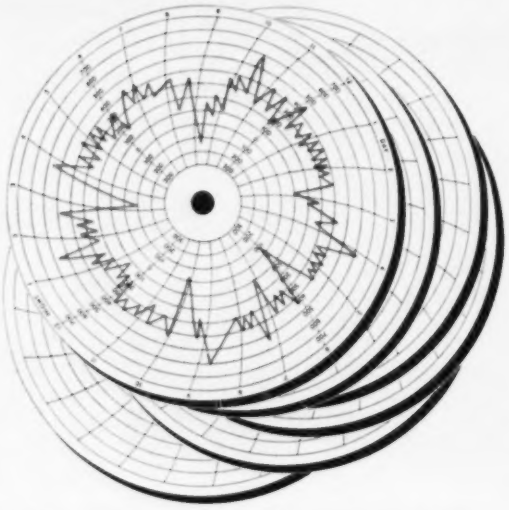
**TRUMBULL (T) ELECTRIC**

**DEPARTMENT OF GENERAL ELECTRIC COMPANY**
**PLAINVILLE, CONN.**

**SILICONE RUBBER COATED FIBERGLAS TUBING**

# BH "1151"

**ELECTRICAL INSULATION**



## . . . permanently flexible for Class H temperatures

Will your present high temperature insulation meet these tests? Can it be twisted and bent to withstand operational and assembly stresses — without cracking, crazing or loss of dielectric strength, or flexibility? Will it remain unchanged after *continuous* operation from −90°F. to 400°F. . . . or 15 minutes at 600°F., 4 hours at 500°F., 96 hours at 450°F.?

BH "1151" will! Its remarkable flexibility and dielectric strength is built into its base materials. BH "1151" combines two great inorganic materials — Fiberglas and Silicone Rubber. The result is electrical tubing and sleeving with remarkable long life — with flexibility for the life of the insulation.

BH "1151" will not support fungus growth — offers excellent chemical resistance. Meets *all* applicable Class H NEMA specifications.

Available in colors, for circuit tracing and coding in economical continuous coils, 36 inch lengths, or in short pieces cut to individual specifications. Made in Grades H-A-1, H-B-1, H-C-1 and H-C-2, rated up to 7,000 volts. For complete facts on superior BH "1151" write for data sheets and samples today.

Address Dept. W-92
Bentley, Harris Manufacturing Co.
Conshohocken, Pa.

# BH *Fiberglas** SLEEVINGS

*BH Non-Fraying Fiberglas Sleevings are made by an exclusive Bentley, Harris process (U. S. Pat. No. 2393530). "Fiberglas" is Reg. TM of Owens-Corning Fiberglas Corp.

# The Megger®

## Insulation Resistance Tester

...its own best salesman

**Nearly every electrical man knows or has used the MEGGER Insulation Resistance Tester.**

The Megger Tester has, over the years, become an integral part of electrical operations everywhere. Through its inherent qualities of ruggedness, accuracy, and dependability it has earned for itself the enviable distinction of being the most widely accepted device for measuring electrical resistance.

Right in stride with today's pace of production, the Megger Insulation and Resistance Tester is demonstrating, in severe industrial service, that it is the most practical and economical means for making insulation resistance tests within the ranges of the available Megger instruments.

MEET THE WHOLE FAMILY

On the next page we have illustrated and briefly described the instruments which now comprise the Megger Family of Insulation and Resistance Test Sets—all represent variations of and improvements on the original Megger Tester.

(over)

## JAMES G. BIDDLE CO.

Electrical & Scientific Instruments • 1316 Arch Street • Philadelphia 7, Pennsylvania

# The Famous Family of *Megger*® Insulation Testers

One of the outstanding characteristics of all types of Megger instruments is quality of a high order. The performance and endurance records which these instruments have achieved are difficult, if not impossible, to match in any type of portable testing device. For insulation resistance measurements Megger instruments are *the recognized standard*. Today more than ever they are "indispensable tools" for electrical preventive maintenance and other electrical resistance testing in the field, plant, or laboratory.

Such developments as the rectifier-operated and dual-operated (hand or rectifier) sets perform repetitive tests more conveniently, more effectively, than can be done by hand cranking. Conversely there is no substitute for the hand generator in the field and for emergencies where supply current is unavailable.

## HEAVY-DUTY TYPE MEGGER INSULATION TESTERS

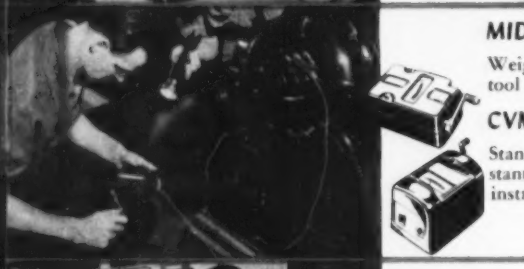
Standardized ratings up to 50,000 megohms and 2,500 volts d-c with d-c generator for either hand or motor operation. Special ranges up to 100,000 megohms and 5,000 volts d-c.

*Bulletin 21-20-IN.*

## MEG TYPE OF MEGGER INSULATION TESTERS

These light weight, easy-to-use instruments are available with ranges up to 2000 megohms, 1,000 volts d-c. Optional accessory features include ohm scales 0 to 10,000 ohms and ratio and discharge switches. *Bulletin 21-45-IN.*

RECTIFIER-OPERATED and DUAL-OPERATED MODELS are available in the same ranges for repetitive production or inspection tests. Complete details in *Bulletin 21-46-IN.*



## MIDGET MEGGER INSULATION TESTER

Weighs only 3 pounds and is completely self-contained. A handy tool kit instrument; ratings up to 50 megohms, 500 volts d-c.

## CVM CONSTANT-VOLTAGE TYPE MEGGER TESTER

Standard ranges up to 50 megohms, 500 volts d-c, with built-in constant voltage generator; ohm scale and selector switch optional. Both instruments described in *Bulletin 21-85-IN.*

## BRIDGE-MEG INSULATION *and* RESISTANCE TEST SET

A Wheatstone Bridge and the Meg Type of Insulation Tester combined in one instrument which performs practically every electrical resistance measurement from a fraction of an ohm up to 1000 megohms. The addition of the Varley Loop feature is optional. For versatility and convenience this instrument is unsurpassed.

Ask for *Bulletin 21-60-IN.*

**James G. Biddle Co.**

*Electrical & Scientific Instruments*

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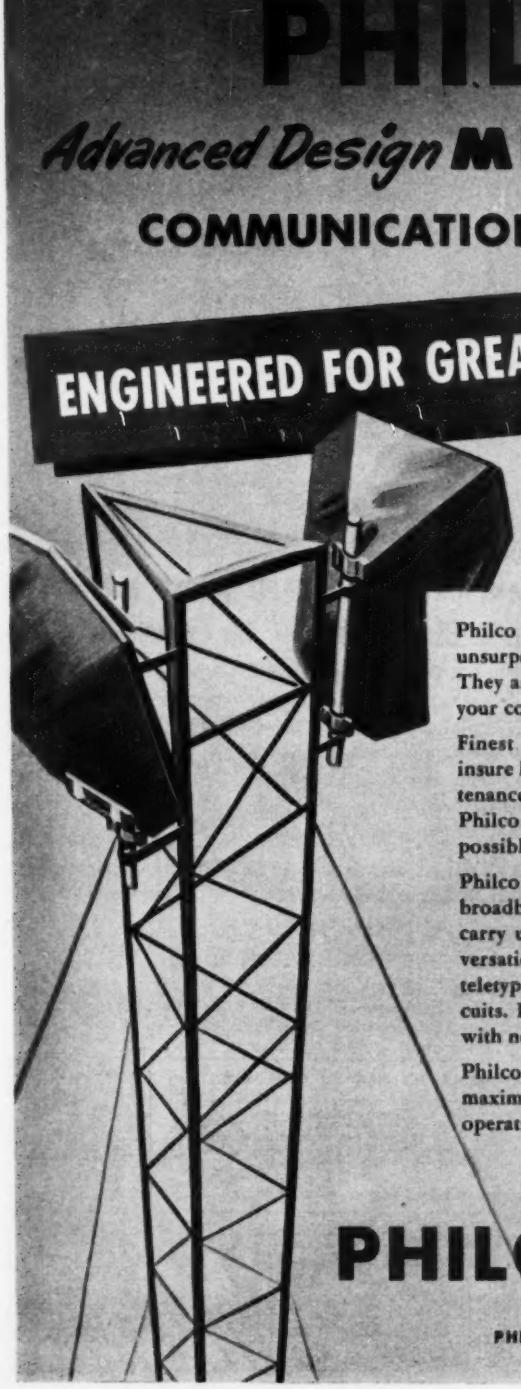
# PHILCO

## *Advanced Design* MICROWAVE

## COMMUNICATIONS SYSTEMS

## ENGINEERED FOR GREATEST ECONOMY!



Philco *Advanced Design* Microwave Systems are unsurpassed in reliability, performance and economy. They are designed to give you the greatest value for your communications dollar!

Finest quality components, conservatively rated, insure long life and economy of operation and maintenance. Years of production experience enable Philco to produce microwave systems for the lowest possible cost consistent with highest quality.

Philco *Advanced Design* Microwave is flexible. The broadband microwave channel may be divided to carry up to 24 simultaneous 2-way telephone conversations . . . or be further divided for telegraph, teletype, telemetering, signaling or supervisory circuits. Future expansion can be easily accomplished with no loss of original investment.

Philco *Advanced Design* Microwave Systems give you maximum reliability . . . plus *low cost* installation, operation and maintenance. *Don't settle for Less!*

## PHILCO CORPORATION

**INDUSTRIAL DIVISION**

**PHILADELPHIA 34, PENNSYLVANIA**

# T&B METHOD
## Fittings and Tools for ALUMINUM and Copper Conductors

FOR ACSR & ALL ALUMINUM CABLES

Tension Splicers

Dead Ends

Jumper Splicers

Repair Sleeves

Light Portable Tools (for tower work)

FOR UNDERGROUND & INDOOR INSTALLATION

Splicers

Terminals

Taps

Connectors

## CONDUCTANCE OF ACSR DEAD ENDS* IS BETTER THAN THE CABLE'S... when you use T & B Method Fittings

The body of a T & B Dead End for ACSR — a single aluminum tube — forms an uninterrupted current path. Conductance is higher than for the same length of cable! Patented T & B Method of compression scrapes oxide off cable for high cable-to-fitting conductance — develops 95% or more of listed cable breaking strength. You get a top-quality job — electrically and mechanically — with T & B Method Fittings!

TOOLING IS LIGHT — PORTABLE — POWERFUL . . . AND ECONOMICAL! Tools are easy to carry — easy to use. An installing head weighing only 45 pounds develops 40-ton pressure. T & B Method saves you money because one tool and die install all fittings for a single size of ACSR cable.

ENGINEERED RIGHT . . . DISTRIBUTED RIGHT

T & B Method fittings and tools, like all T & B quality fittings, are designed for lowest installed costs. They're furnished exclusively through local T & B distributors under the T & B Plan.

**FROM CIRCLE TO HEX IN SECONDS**

You start with a circular cable (a typical one consists of about 75% metal, 25% air). You compress it, by the T & B Method, to the equivalent area of a solid rod—as the dies force the fitting from circular to the characteristic T & B Method hexagonal shape—all in the space of just a few seconds!

FOR THE FULL STORY ON THE T & B METHOD, WRITE FOR BULLETIN s 87

THERE'S A T&B ENGINEERED PRODUCT for every wiring job in the complete T & B line of fittings for all conductors and raceways

Manufacturers of Electrical Fittings

# THE THOMAS & BETTS CO.

INCORPORATED

35 Butler Street
Elizabeth 1, New Jersey
Thomas & Betts, Ltd., Montreal, P. Q., Canada

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## You'll know **WHY** these leading companies selected **HONAN-CRANE** oil purification equipment

**FOR THEIR TURBINES, DIESELS, TRANSFORMERS, CIRCUIT BREAKERS, SWITCH GEAR AND OTHER OIL-FILLED EQUIPMENT**

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| THE ANNEVAR MILLS Ravenna, Ohio | FLORIDA POWER CORP. St. Petersburg, Fla. | UNION ELECTRIC STEEL CORP. Carnegie, Pennsylvania | MISSOURI PACIFIC R. R. CO. St. Louis, Missouri | MUNICIPAL LIGHT & POWER PLANT Hutchinson, Minn. |
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**. . . and many others!**

WORLD'S LEADING OIL FILTER MANUFACTURER

Honan-Crane Corporation
LEBANON, INDIANA
a subsidiary of
Houdaille-Hershey Corp.

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Please send me Free Copy of your booklet, "Proven Protection Against Oil Failure."

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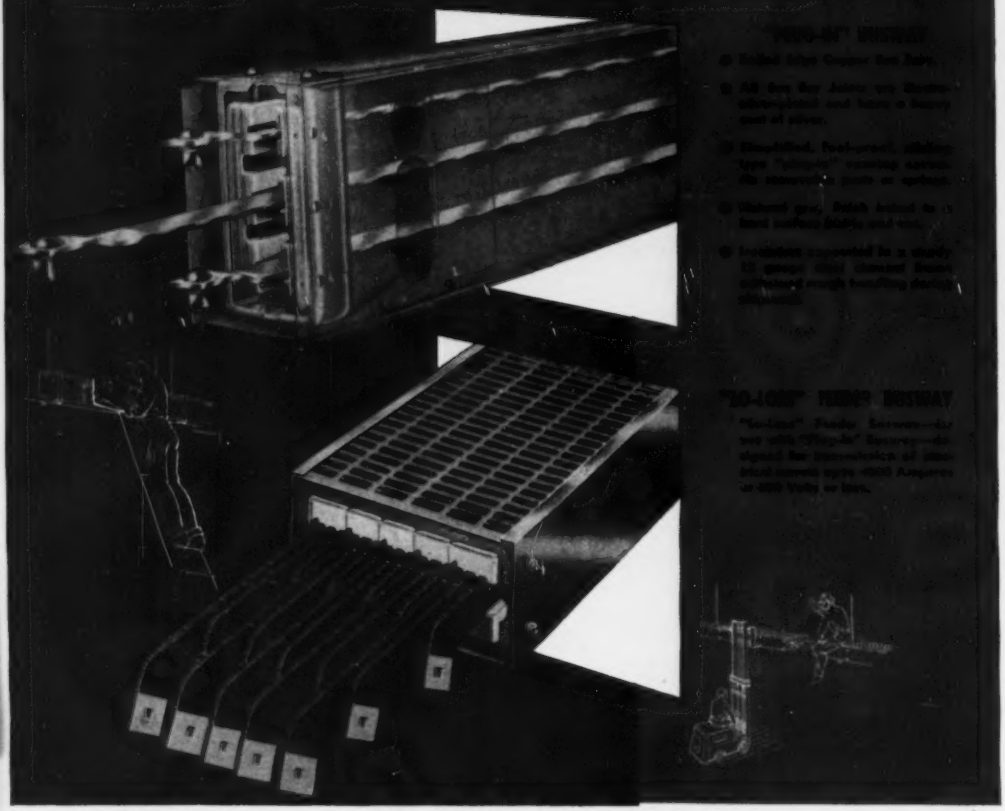
**All Honan-Crane Equipment is Sold on a PERFORMANCE GUARANTEED Basis**

# new workhorses



**National Electric**
**"Plug-In" Busway and**
**"Lo-Loss" Feeder Busway...**
**The only busways**
**with such**
**rugged construction**

National Electric Busways are especially designed to meet the rugged requirements of American industry. They offer the most economical, convenient, flexible and salvable layout possible for industrial or commercial installations. Check these *money-saving* "workhorse" features:

**TOUGH**—National Electric busway incorporates a heavy 12 gauge steel channel to independently support and protect the insulator.

**EFFICIENT**—With "Lo-Loss" Busway, voltage drop is less than 2.2 volts per 100 feet for a concentrated load. Where the load is distributed, the voltage drop is approximately 1 volt per 100 ft.

**FLEXIBLE**—"Lo-Loss" is approved by Underwriters' Laboratories for horizontal or vertical mounting. Branch circuit and "Plug-In" Busway take-offs can be made anywhere.

**CONVENIENT**—Factory fabricated sections go up *quick*. With "Plug-In" Busway, machinery can be "plugged-in" any time without shutting down the production line. Especially convenient for congested areas.

*APPROVED BY UNDERWRITERS' LABORATORIES, INC.*

EVERYTHING IN WIRING POINTS TO

**National Electric Products**

**PITTSBURGH, PA.**

*3 PLANTS • 7 WAREHOUSES • 42 SALES OFFICES*

General View of Tyrone Power Station
Kentucky Utilities Company
Sargent and Lundy
Consulting Engineers

# Bartlett-Snow coal handling at *Tyrone*

● The illustration above shows the first 50,000 KW unit of a plant which is to be extended into a 170,000 KW station. All coal handling equipment including the track and reclaiming hoppers and grillage, duplex feeder, single plate feeder, conveyors, galleries, surge hopper and all supporting structures were detailed and fabricated in our shops and installed by us to Sargent and Lundy's specifications. For maximum efficiency and fixed unit responsibility, let the Bartlett-Snow coal handling engineers, with their long experience and complete facilities, work with you on your next job.

Track and Reclaiming Hopper, Crusher House, Stocking Out Conveyor and Storage Yard

Single Plate Feeder Discharging Reclaimed Coal to Main Belt Conveyor System

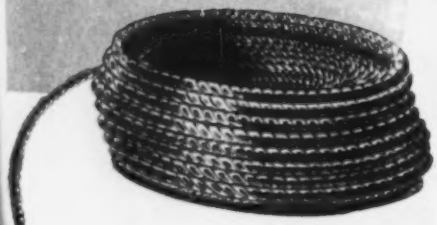
DESIGNERS ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS ERECTORS

*"Builders of Equipment for People You Know"*

# WHY DOES Hot Dip GALVANIZING MAKE TRIANGLE ARMORED CABLE BETTER?



There are two methods of galvanizing armored cable —hot-dip galvanizing and electro galvanizing. Hot-dip galvanizing used by Triangle, means the steel strip which forms the armor passes directly through pure zinc held at an extremely high temperature. By this method, Triangle armor is *thoroughly* coated, *thoroughly* protected—inside and out—without so much as a pin-point hole to let in moisture.

This means longer life because destructive elements that might cause rust or corrosion, for instance, can't get at the steel.

The way to be sure to get hot-dip galvanized armored cable, is to use Triangle!

*In addition—*

**TRIANGLE *Armored Cable*—**

- **Bends easily in a short radius**
- **Cannot open accidentally**
- **Provides for double-bushing**
- **Is bonded in sizes 12 and 14**

AT TRIANGLE *It Must Be Right*

The Trade Mark of Top Quality

"IT MUST BE RIGHT"

## TRIANGLE CONDUIT & CABLE CO., INC.

**NEW BRUNSWICK, NEW JERSEY**

"Glazon" Building Wire • "Glazon" Non-Metallic Sheathed Cable • Control Wire • Armored Cable • Service Entrance, Service Drop Cables • Varnished Cambric, Braided or Leaded • Trioprene Trench, Power & Parkway Cables • Bare Wire • Rigid Conduit Hot-Dipped Galvanized & Black Enameled • Electric Metallic Thin Wall Conduit • Flexible Steel Conduit.

# POWER FAILURE PREVENTED!

## —Thanks to the split-second action of a BLAW-KNOX FOG SYSTEM

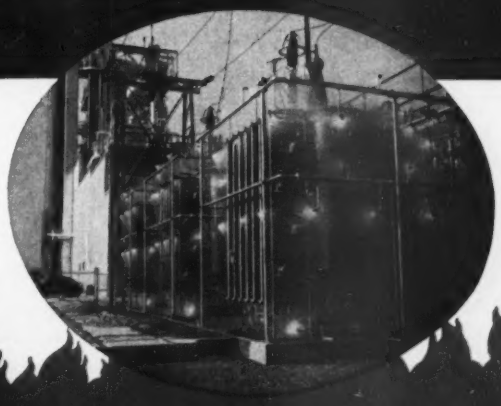
A transformer fire, no matter how small, can disrupt the 24-hour service now taken for granted of utilities. And, while financially unimportant, it may easily cause a blackout affecting defense industries, hospitals, homes and municipal properties. Don't you think it is your obligation to protect both your own property and customer good-will with the most efficient system for transformer protection?

At your request a Blaw-Knox Engineer will survey your fire hazards, prepare a preliminary layout of the system that will give you the utmost in fire protection, and submit an estimate of costs—all without obligation.

**BLAW-KNOX CONSTRUCTION COMPANY**
**BLAW-KNOX SPRINKLER DIVISION**
829 Beaver Ave., N.S., Pittsburgh 33, Pa.

• • •

*Deluge Systems, Wet Pipe Systems, Dry Pipe Systems, Water Spray and Fog Systems, Rate-of-Rise Sprinkler Systems, and Foam and Carbon Dioxide Extinguisher Systems.*



"LITTLE JOEY SPRINKLER"
Always on the Job

# BLAW-KNOX

AUTOMATIC
FIRE PROTECTION SYSTEMS

FLASHOVER DISTANCE LOST 16%
LEAKAGE DISTANCE LOST 32%

FLASHOVER DISTANCE LOST 68%
LEAKAGE DISTANCE LOST 83%

# WHAT HAPPENS on your lines WHEN

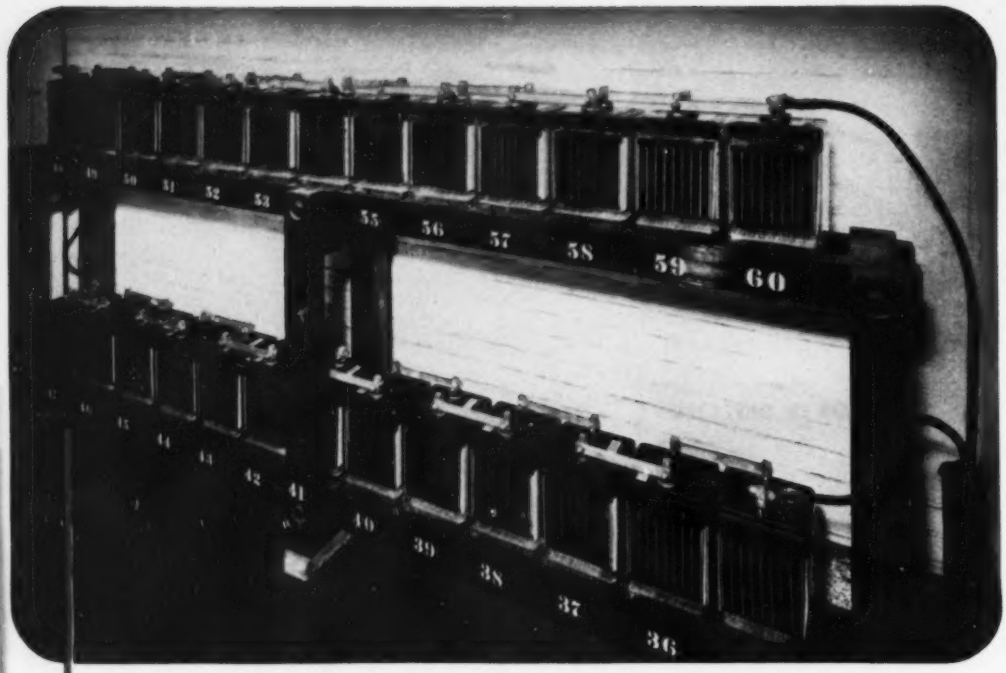
Lapp

LAPP INSULATOR COMPANY, INC., LE ROY, NEW YORK

FLASHOVER DISTANCE
LOST 1%
LEAKAGE DISTANCE
LOST 7%

# AN INSULATOR PETTICOAT GETS KNOCKED OFF?

If damage from flashover and mechanical attack is a major cause of transmission insulator replacement on your system, consider this fact. Lines on Lapp Line Post insulators almost never suffer outages due to insulator failure. In fact, most operators don't even bother to replace Lapp Line Posts that have flashed over or have been hit by stones or bullets. The reason is in the Line Post design—flashover or mechanical attack, of severity sufficient to shatter ordinary insulators, will break off one or two petticoats at the most, leaving the Line Post body intact, flashover and leakage distances only negligibly decreased, essential efficiency unimpaired. The result is in the maintenance records of hundreds of companies—records showing that *lines on Lapp Line Posts have fewer outages, require fewer insulator replacements and less maintenance than comparable lines on any other type of insulator.* The odds are all on your side when you build your transmission lines on Lapp Line Posts—for maximum performance, maximum economy.




Part of installation of 60-cell DME-17 Exide-Manchex in Faraday Street Substation of Worcester County Electric Company, Worcester, Mass.

**MORE THAN 25 YEARS OF SERVICE—THEN ANOTHER EXIDE—THE...**

# Exide-Manchex BATTERY

In January, 1926, the Worcester County Electric Company installed in its Faraday Street Substation a 55-cell EMG-9 Exide Battery. Not until last October, 25 years and 9 months later, was it replaced. Again, the company's choice was an Exide—the new, improved Exide-Manchex, now on duty providing power for switchgear operation, emergency lights and other services.

You, too, can depend on the Exide-Manchex for positive switchgear operation . . . instantaneous power, when and as needed . . . extra long battery life . . . low costs of operation, maintenance, depreciation.

Use the Exide-Manchex for all your stationary battery requirements. You'll find Exide-Manchex your best battery buy . . . *at any price.*

• • •

Various sizes and types of Exide Batteries, up to 100 ampere hours capacity, are available in plastic containers.

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 2

*Exide Batteries of Canada, Limited, Toronto*

"EXIDE" and "MANCHEX" *Reg. T.M. U.S. Pat. Off.*

*1888 . . . DEPENDABLE BATTERIES FOR 64 YEARS . . . 1952*

# Styles for Every Mounting, Rating, and Phase Spacing

# PACIFIC ELECTRIC AIR SWITCHES

**7.5 to 230 kv**

WHATEVER the installation conditions — or dictates of "standardization" — there's a Pacific Electric Advanced-Design Air Switch for every disconnecting or sectionalizing need. Pacific's originations* in the air-switch field have contributed notably to power industry progress.

*Send for Publication DS-195, "Design of Air Switch Contacts for Maximum Service."

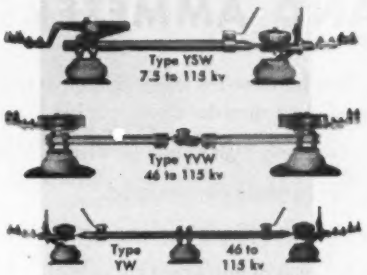
**All switches on this page are NEMA and ASA Standard.**

## SIDE-BREAK TYPES

**in three basic styles**

Forty-four years ago Pacific made the first commercially used rotating-insulator side-break air switch (similar to Type YW at right —the Baum switch), and has improved this type and its successors ever since.

Today's Pacific side-break switches have full-floating twin-disk (or segment) roller-wipe silver-to-silver contacts with pressure applied by pre-loaded springs that carry no current. Used mostly on towers or structures.

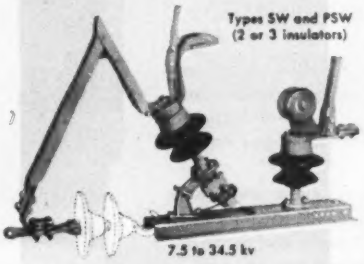



## TILTING-INSULATOR TYPES

**mostly for pole-top use**

And forty years ago Pacific made the first commercially used tilting-insulator switch, and has continuously developed this type in several forms ever since.

Today's Pacific tilting-insulator switches have contacts similar to those used on side-break switches, described above, except the twin-disk rollers are on edge. Underhung counterbalanced interphase shaft and provision for hot-line cut-in are other features.



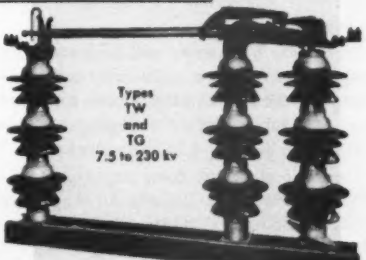

**Ask for catalogs of any style of switch.**

**All switches are pictured as single-pole units. Switches comprise three such units plus operating mechanism and usual accessories.**

## "TWISTER" BLADE TYPES

Another important Pacific type, the "twister" blade switch with enter-turn vertical break, has undergone much development by Pacific since its manufacture was started 17 years ago.

These switches embody full-floating silver-to-silver adjustable high-pressure contacts applied by independently mounted pre-loaded springs (forks do not bend as springs). Simplicity of enter-turn linkage is another feature. Many ratings available without hinge-end jumpers.




## PACIFIC ELECTRIC MFG. CORPORATION

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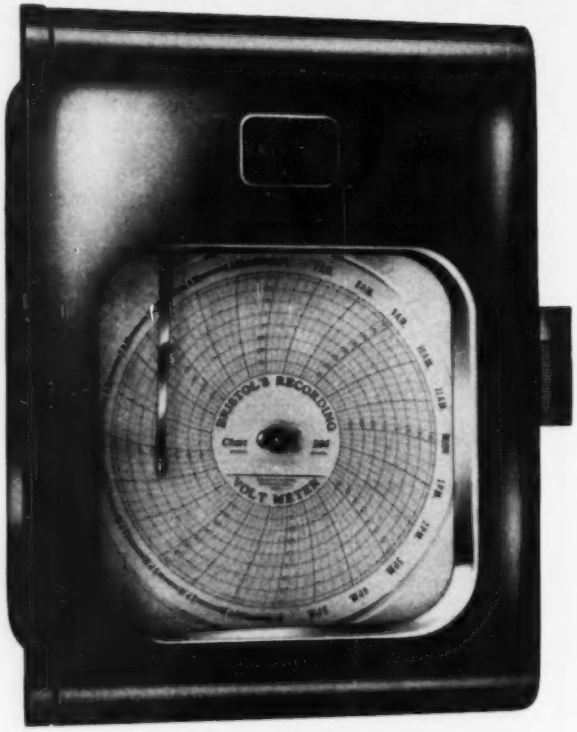
# 6 Reasons why you get greater accuracy with Bristol Series 500

## RECORDING VOLTMETERS AND AMMETERS

1. Low burden—the lowest burden of any round-chart recorder on the market.
2. Extremely high torque gradient.
3. Temperature compensated.
4. Shock-proof moving element mounting.
5. Leveling of instrument not critical.
6. Continuously legible recording on sudden changes—up to full scale value.

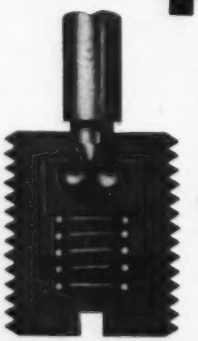



Bristol Recording Voltmeters and Ammeters use moving-iron measuring mechanisms, known for high torque . . . refined by Bristol engineers for greater accuracy and ruggedness.

Advances in electrical measurement naturally come from Bristol, experienced for nearly 60 years in building hundreds of thousands of recording voltmeters and ammeters for almost every application . . . the finest, most dependable products.

Series 500 Voltmeters and Ammeters are designed for easy use, with dust- and moisture-proof die-cast aluminum case; quick-set chart hub for easy chart changing; non-obscuring pen lifter; and snap-on chart plate.

Find out all about these superior instruments by writing for Bulletin E1111 to THE BRISTOL COMPANY, (116) Bristol Road, Waterbury 20, Conn.



**Permanent mounting** offered in three models: interchangeable surface and flush, surface-panel and flush panel. Note the pleasing, well-balanced appearance. Also, *portable instruments* are offered in two models: for setting on floor or table; for mounting on walls or poles and general service.

**New ball-bearing suspension,** loaded by a coil spring, prevents damage even under severe mechanical shock. Stainless steel bearings and shaft are almost tool hard and are corrosion-resistant.

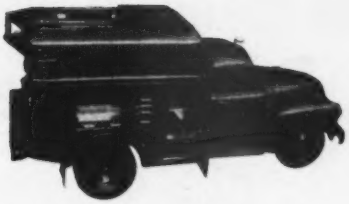
# BRISTOL

*The dependable Guidepost of Industry*

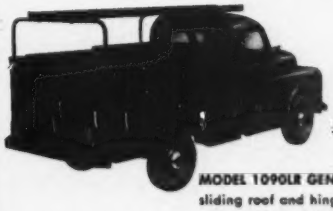
**AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS**

# HOLAN

# . . . Utility Bodies You Can't Afford to Overlook

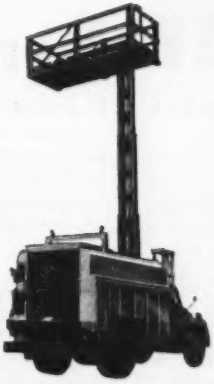


**MODEL CL-112 LIGHT LINE BODY** with "curbside loading". This is one of ten standard Holan body models for line construction and maintenance work.



**MODEL 1090LR GENERAL SERVICE BODY** with sliding roof and hinged rear panel that locks to tail gate. There are nine standard Holan general service body models for chassis from ½ to 1½ ton capacity.

**MODEL 1520 AERIAL LADDER** is available in heights of 19, 21, 23 and 25 feet . . . a safe, sturdy ladder that can be operated by one man. When carried overhead the truck bed is clear for other work.



**MODEL 1330R HYDRAULIC TOWER** with rotary platform. Holan hydraulic towers elevate platform to 30 feet, lower it to 10 feet, 3 inches. Operation is completely automatic. Rotary, stationary and transverse platforms are available.

Holan utility bodies can reduce your construction, maintenance and servicing costs. This statement is verified by the increasing number of utility companies that will use no other make.

In recent years Holan engineers have introduced many advanced designs such as "curbside loading", new compartment arrangements, improved load distribution and "feather action" recessed handles. These and other exclusive Holan features have aided utility companies considerably in improving their construction and maintenance efficiency.

There's a way to find out yourself. Compare Holan bodies before you buy.

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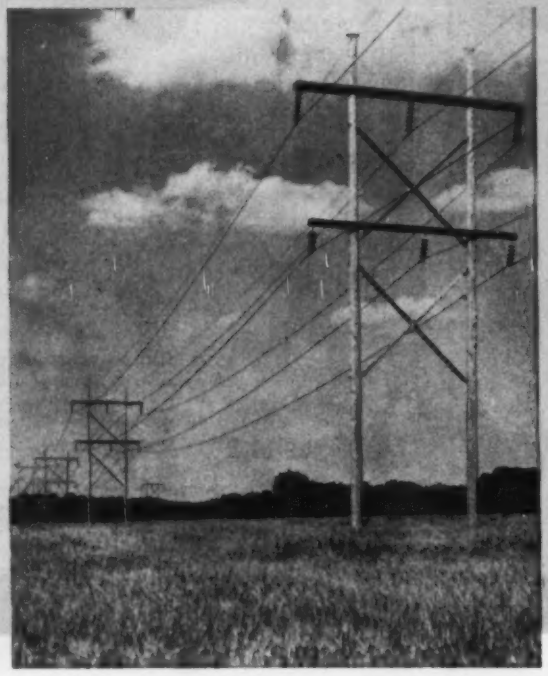
# Profitable POLE-LINE MAINTENANCE tomorrow



belongs to those who

# Prepare for it today!

## LIFE-SPAN WESTERN RED CEDAR POLES

**assures years of l-o-n-g-e-r trouble-free service**

Whenever maintenance costs go down company profits go up! Whenever you specify LIFE-SPAN Poles for pole-line construction jobs, you are insuring lower pole-line maintenance costs tomorrow—assuring greater company profits for many years to come.

Straight, strong, lightweight Western Red Cedar poles treated the LIFE-SPAN way are immune from decay or insect invasion throughout the service life of the pole. Their clean surfaces build good public relations for utility companies, while linemen who handle and work on them like them because they are both clean and safe to handle. To insure more company profits tomorrow, specify LIFE-SPAN poles today!

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Naugle Pole & Tie Corp.
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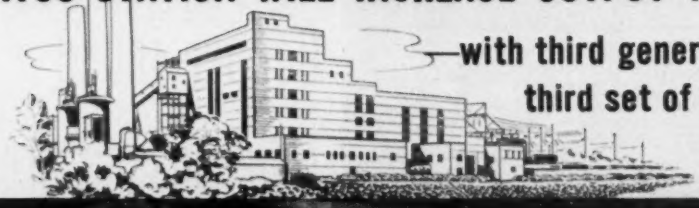
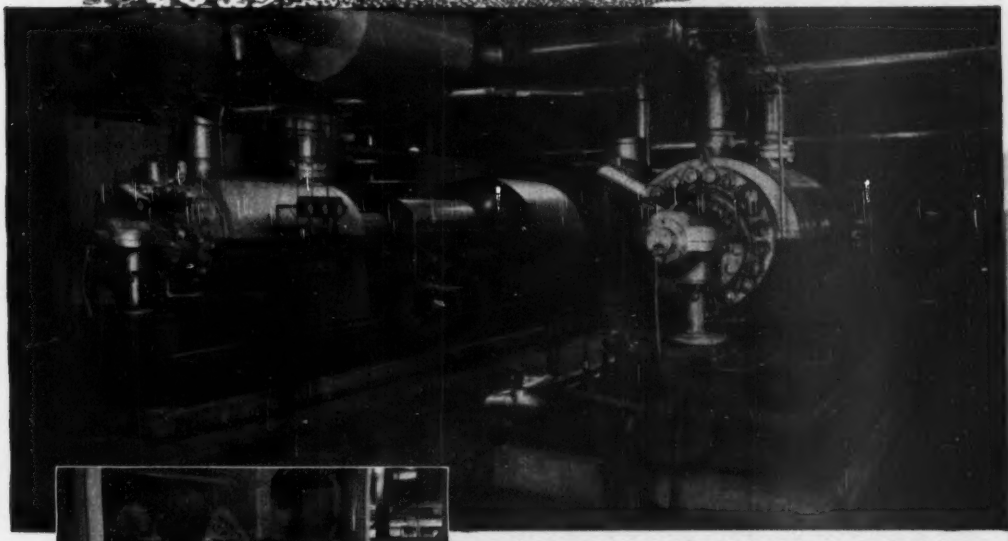
Life Span

**CONSOLIDATED TREATING CO.** MINNEAPOLIS, MINNESOTA

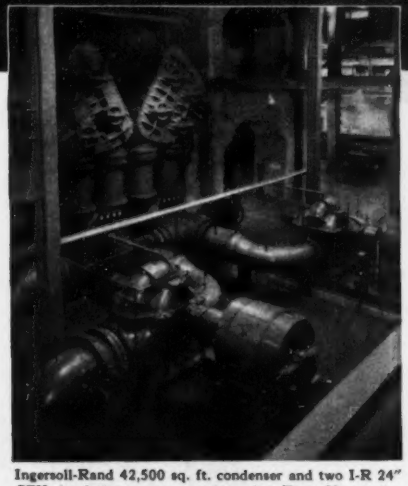
# TITUS STATION WILL INCREASE OUTPUT TO 240,000 KW



## —with third generating unit and third set of I-R auxiliaries



Two Ingersoll-Rand 10-stage boiler feed pumps, each rated 1211 gpm at 1670 psi, serving generating unit no. 1 at Titus Station. The pumps are motor driven through fluid couplings.



Ingersoll-Rand 42,500 sq. ft. condenser and two I-R 24" CFV circulating pumps on unit no. 2 at Titus. New equipment for unit no. 3 will be similar.

*Ingersoll-Rand Pumps, Condenser and Air Ejector will duplicate equipment on the two units now in operation.*

Metropolitan Edison's Titus Station, in Reading, Pa., is expanding again—with construction under way for the addition of a third, 80,000 kw generating unit. This new unit, scheduled for completion early next year, will bring Titus Station's total capability to 240,000 kw.

For this latest addition Gilbert Associates, Inc., designers for the utility, have again specified complete Ingersoll-Rand auxiliaries. Two, 10-stage, 5-inch CHTA "double case" pumps will deliver 571,000 lb. per hr. of 250° feedwater at a pressure of 1670 psi. The 42,500 sq. ft. surface condenser will be supplied with 36,900 gpm of cooling water by two 24" circulating pumps. Reversing valves on the condenser permit backwashing the tubes without shutdown. Two I-R 4-stage condensate pumps will handle 1700 gpm from the condenser hot-well and an I-R steam-jet air ejector will maintain condenser vacuum.

When you specify Ingersoll-Rand power plant equipment, you are assured of dependable operation—backed by an outstanding record of service to utilities throughout the world.

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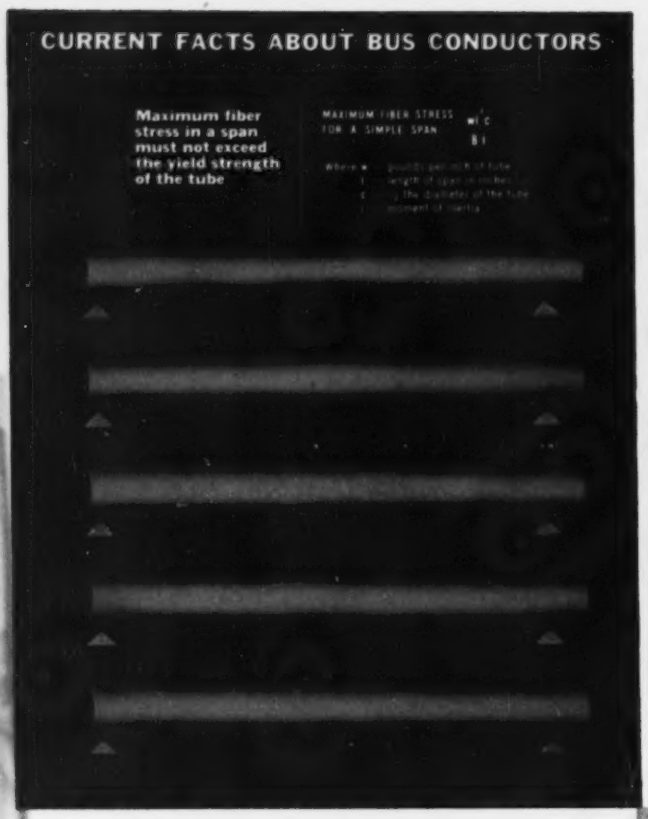



# Copper round tube busses are extra rigid– permit longer spans between supports

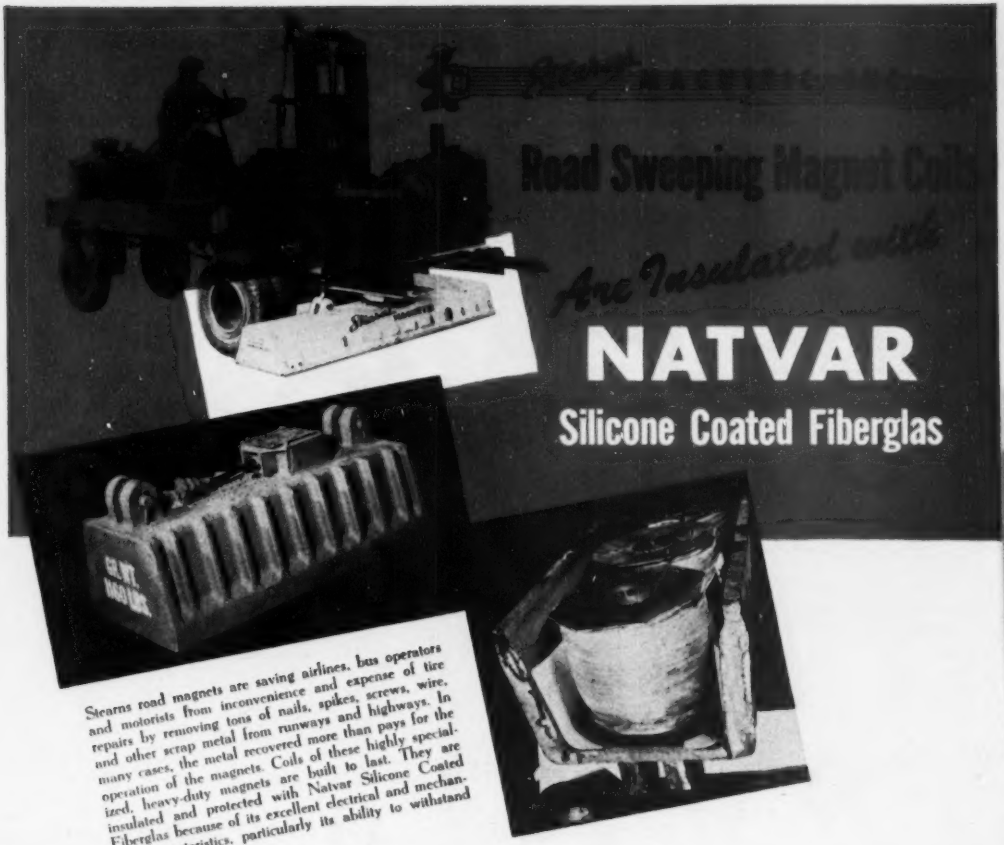
ANACONDA round tubular conductors provide a relatively large cross-sectional area in minimum space, with great rigidity, permitting long spans. The copper conductor material is disposed so as to offer the lowest impedance to the flow of alternating currents. Therefore the watt losses are low by comparison with other conductor shapes.

There is a complete line of ANACONDA Copper Bus Conductor designs for every type of installation and power requirement, including flat bars, round tubes, channel square busses, angle square busses, square tubes and cable conductors. The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

**free book!**

**Write today for latest revised edition of the illustrated book, "AnacondA Copper Bus Conductors." It contains a wealth of information about new designs and arrangements for bus conductors. It may help you solve your bus design problems.**

**carry the load with ANACONDA® bus conductors**




Stearns road magnets are saving airlines, bus operators and motorists from inconvenience and expense of tire repairs by removing tons of nails, spikes, screws, wire, and other scrap metal from runways and highways. In many cases, the metal recovered more than pays for the operation of the magnets. Coils of these highly specialized, heavy-duty magnets are built to last. They are insulated and protected with Natvar Silicone Coated Fiberglas because of its excellent electrical and mechanical characteristics, particularly its ability to withstand heat and moisture.

Stearns Magnetic, Inc., Milwaukee, manufactures magnetic clutches, brakes, separators, pulleys, drums, and other magnetic devices and equipment for industrial uses, where reliability of performance is essential.

This calls for a highly specialized engineering knowledge of magnetism, its practical application to specific problems, and a thorough familiarity with the characteristics of materials under actual operating conditions. Natvar Silicone Coated Fiberglas was selected for their road magnet because of its proven resistance to heat and moisture.

Natvar flexible electrical insulating materials have good electrical and mechanical properties and are consistently uniform, no matter when or where purchased. They are available either from your wholesaler's stock or direct from our own.

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1
CHARGES AT ANY AIR PUMP. Operates at 150 lbs. pressure.
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COVERS GREATER AREA with Kidde's cloud-like discharge pattern.
3
POWDER WON'T PACK. Perfect for trucks, garages, factories, etc.
4
PRESSURE GAUGE in pistol-grip handle tells you when air is needed.
5
TRIGGER ACTION gives you finger-tip control.
Kidde

An ordinary air pump will prime this new Kidde dry chemical extinguisher with more fire-killing power than any other unit its size!

See how easy it is to recharge! Just unscrew the head, put in five pounds of dry chemical, screw the head back on and it's ready to take on air pressure from any plant or service station air pump.

And see how easy it is to operate! One hand swings this portable extinguisher into action. One finger squeezes the trigger. Poof! A cloudlike pattern of dry chemical smothers the fire while you remain safely behind a curtain of heat-absorbent powder.

This revolutionary new Kidde extinguisher is so safe, so sure, you'll find it a necessity for trucks, garages, power plants, electrical equipment—wherever there is a danger of small fires.

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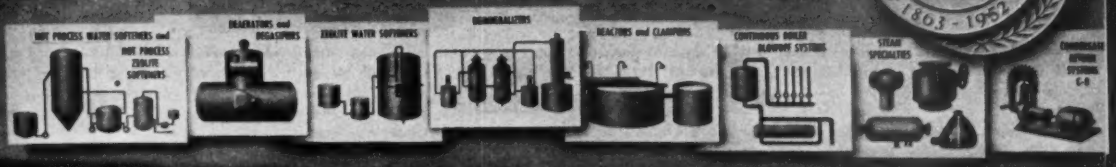

## WHY NOT DO IT THE EASY WAY? . . . *by BUSTER*

# You'll find the ANSWERS in this FREE CRESCENT BOOK!

Every professional and amateur mechanic should have a copy of this profusely-illustrated, 28 page booklet. In addition to page after page of "how-to-do-it" information, it illustrates and describes about fifty of the most popular Crescent and Crestoloy Tools. A postcard request will bring *your* free copy.

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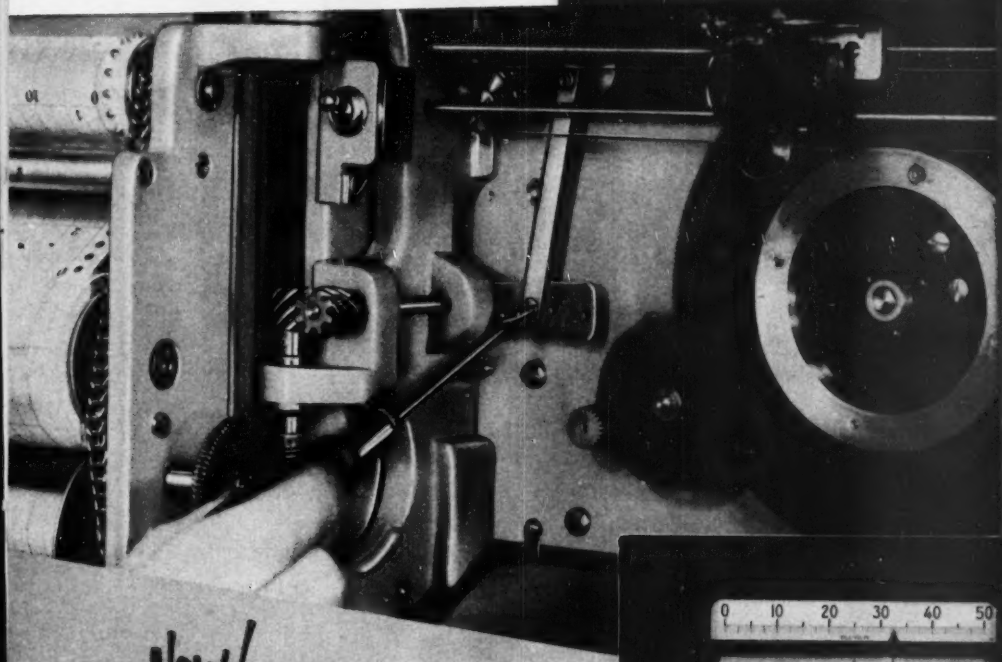
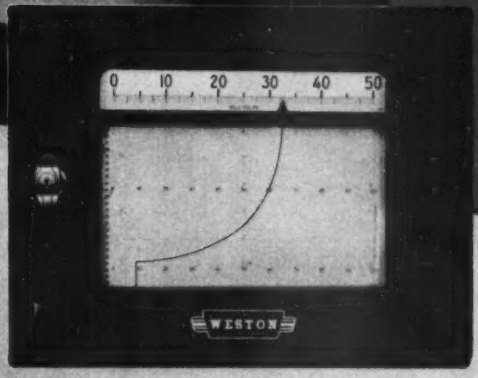
**CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK**

# You change chart speeds this simple way






## Now! simplified... Recording Potentiometer by WESTON

Maybe you seldom change chart speeds . . . while other users frequently do. But should the need arise, isn't it best to have a *flexible* instrument . . . one quickly adaptable for any requirement that comes along?

As shown above, the change is simple and quick with the new WESTON Recording Potentiometer. No multiplicity of gears involved . . . no complicated gear changes to make. This speed linkage permits quick selection of 5 different speeds by simple screwdriver adjustment. And these speeds can be doubled or quadrupled by quickly changing only two gears.

This is just one of a dozen features that make this the simplest, most flexible recorder ever offered. Changing ranges, installing charts, removing amplifier . . . all are just as simple and quick! Combined, they cut maintenance 'way down. And for accuracy and dependability . . . they're assured by the name the instrument bears.

For full details, ask your local WESTON Representative, or write . . . WESTON Electrical Instrument Corporation, 617 Frelinghuysen Ave., Newark 5, N. J. . . . *manufacturers of Weston and Tag Instruments.*

WESTON 9130 **WESTON** *Instruments* INDICATE — RECORD — CONTROL

# ACSR and

ALCOA

# ALCOA

# Alcoa Technical Co-operation

Alcoa pioneered aluminum conductor over 50 years ago . . . has been supplying technical co-operation ever since. That's why Alcoa developed a staff of technicians first in their field.

The six men in the photograph at left have been Alcoa Electrical Conductor Supervisors for an average of seventeen years—a total of over a hundred years of customer service. They represent the quality of the men behind the quality of the product.

For Alcoa delivers only the highest quality wire and cable, aluminum or ACSR, to every job.

Call your nearest Alcoa sales office for Alcoa aluminum wire and cable . . . the best in service.

**ALUMINUM COMPANY OF AMERICA**
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"SEE IT NOW" with Edward R. Murrow
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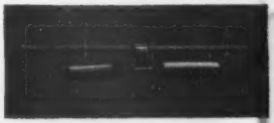
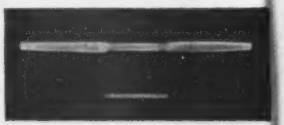
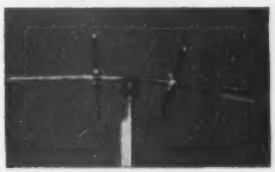
FIRST IN ALUMINUM FIRST IN A·C·S·R

## ALCOA ACCESSORIES

Alcoa has developed a complete line of job-proven accessories for aluminum cable and ACSR.







# A man with a hate

● There's no halfway feeling about fire and its resulting destruction with an expert fire protection engineer... he actually hates to see a little fire roar into a raging inferno and create a sizeable loss.

This personal sense of responsibility is inherent with C-O-TWO Fire Protection Engineers... a definite plus in your behalf. Whether its fire detecting or fire extinguishing ... portables or built-in systems... C-O-TWO means top quality backed by experienced engineering that results in operating superiority for you at all times.

With C-O-TWO Fire Protection Equipment, simplicity, practicability, longevity and minimum maintenance are built-in features that guarantee fast, positive action the instant fire strikes. Furthermore, extensive manufacturing and field installation skills, together with approvals such as the Underwriters' Laboratories, Inc., Factory Mutual Laboratories, Armed Forces and Government Bureaus assure you of the finest in modern fire protection equipment.

Rushed production periods and future expansions are some of the many problems carefully considered in a plant-wide firesafety recommendation by C-O-TWO Fire Protection Engineers... the prime objective always being the best type fire protection equipment for the particular fire hazard concerned.

**WHEN BUSINESS STOPS . . . INCOME STOPS!**

Don't take chances with your investment. Secure the benefits of highly efficient fire protection engineering today... our extensive experience over the years is at your disposal without obligation. Get the facts now!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-in High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-in Smoke and Heat Fire Detecting Systems

**C-O-TWO FIRE EQUIPMENT COMPANY**
NEWARK 1 • NEW JERSEY

C-O-TWO FIRE EQUIPMENT OF CANADA, LTD. • TORONTO 8 • ONTARIO

*Sales and Service in the Principal Cities of United States and Canada*

AFFILIATED WITH PYRENE MANUFACTURING COMPANY

Another Westinghouse Relay Development

# New CO Relay

## gives greater accuracy!

*The Type CO Overcurrent Relay is available in Flexitest or standard rectangular projection case.*

This latest advance in design gives a degree of accuracy heretofore unattainable in an induction disc relay. The reason—a new basic relay development—the "E" element.

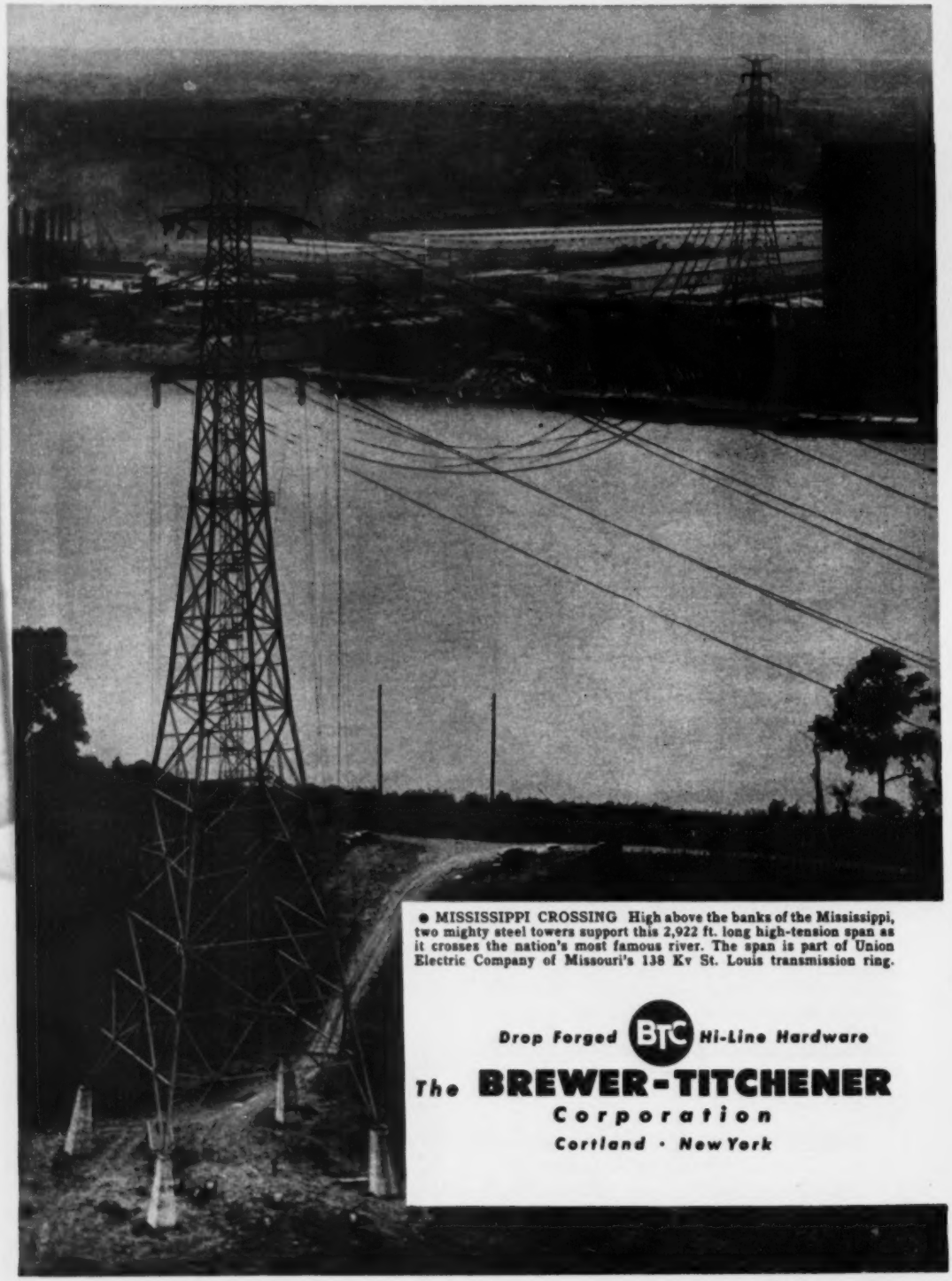
The "E" element has four separate and independent adjustments to make it meet existing time curves accurately—very accurately! This high degree of accuracy permits faster protection for your lines and equipment.

For further assurance of accuracy the new CO Relay offers low-wave form and low-temperature error . . . micrometer adjustment of the permanent magnet . . . constant "pick-up" at all lever settings.

Ask your Westinghouse representative to show you the new CO Relay—he'll be glad to go over it feature by feature with you—or request a demonstration by writing to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-40404

YOU CAN BE SURE...IF IT'S Westinghouse

RELAYS

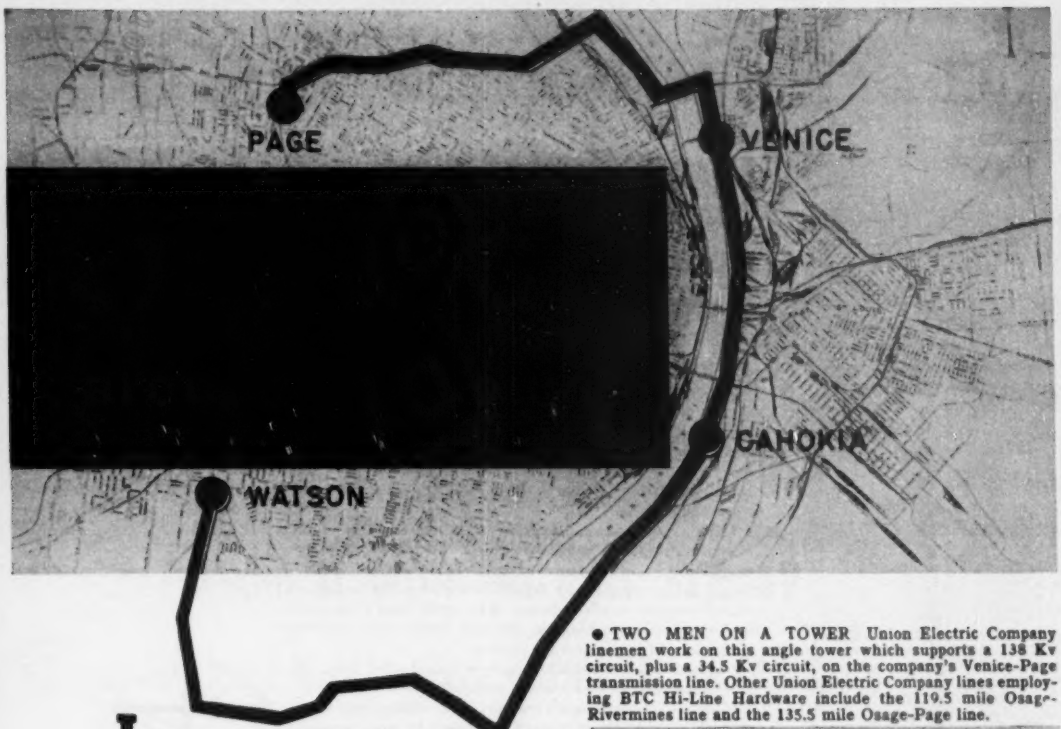


● MISSISSIPPI CROSSING High above the banks of the Mississippi, two mighty steel towers support this 2,922 ft. long high-tension span as it crosses the nation's most famous river. The span is part of Union Electric Company of Missouri's 138 Kv St. Louis transmission ring.

Drop Forged BTC Hi-Line Hardware

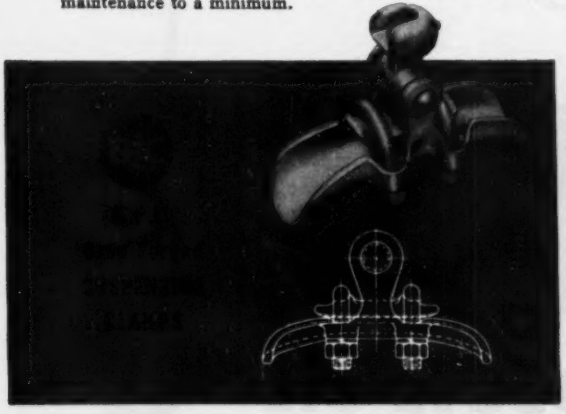
The **BREWER-TITCHENER** Corporation

Cortland · New York



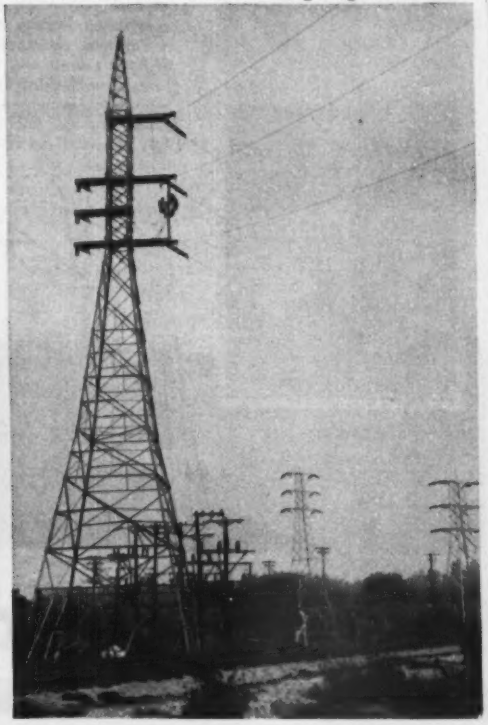

In 1950, Union Electric Company of Missouri added four new lines to its 138 Kv transmission ring around the city of St. Louis. Totaling some 46 circuit miles, these lines each have a 125,000 kva capacity . . . serve as a system tie line around the mid-west metropolis.

Union Electric Company . . . like so many of America's major power concerns . . . has used BTC Hi-Line Hardware for these links in its vital transmission ring. Insist on BTC Drop Forged Clamps and Fittings from your insulator manufacturer . . . you'll find that they're easier to install, give efficient trouble-free performance and help keep maintenance to a minimum.



*Sold through your insulator manufacturer only.*

● TWO MEN ON A TOWER Union Electric Company linemen work on this angle tower which supports a 138 Kv circuit, plus a 34.5 Kv circuit, on the company's Venice-Page transmission line. Other Union Electric Company lines employing BTC Hi-Line Hardware include the 119.5 mile Osage-Rivermines line and the 135.5 mile Osage-Page line.



# Here's Proof of Performance

## A MOVE, A FLOOD AND 37 YEARS OF SERVICE HAVEN'T AFFECTED THESE POLES —THEY'RE PROTECTED BY

# CREOSOTE OIL

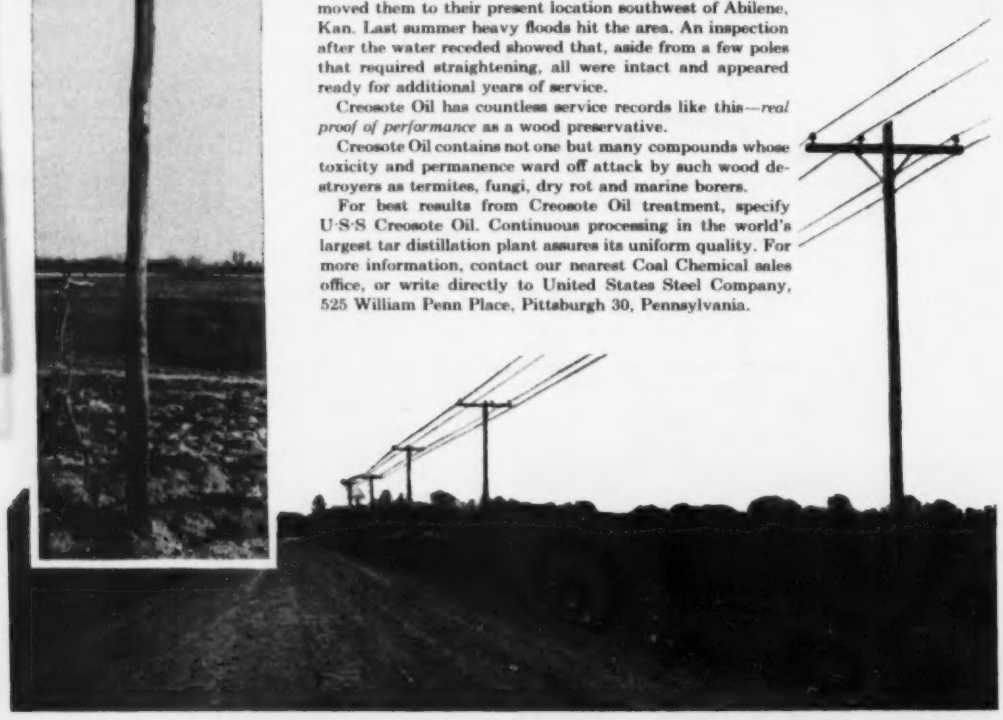
**HERE'S ANOTHER EXAMPLE** of the effectiveness of Creosote Oil as a wood preservative. In 1915 these southern pine poles were treated with Creosote Oil and installed near Gypsum, Kansas.

Fifteen years later, the owner, United Power & Light Corporation (now The Kansas Power and Light Company), moved them to their present location southwest of Abilene, Kan. Last summer heavy floods hit the area. An inspection after the water receded showed that, aside from a few poles that required straightening, all were intact and appeared ready for additional years of service.

Creosote Oil has countless service records like this—*real proof of performance* as a wood preservative.

Creosote Oil contains not one but many compounds whose toxicity and permanence ward off attack by such wood destroyers as termites, fungi, dry rot and marine borers.

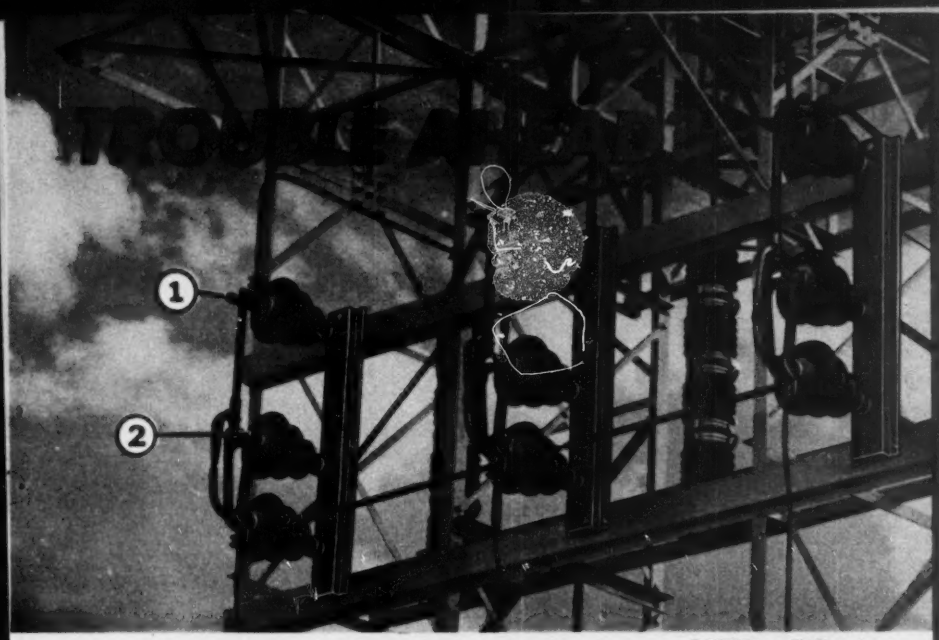
For best results from Creosote Oil treatment, specify U·S·S Creosote Oil. Continuous processing in the world's largest tar distillation plant assures its uniform quality. For more information, contact our nearest Coal Chemical sales office, or write directly to United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pennsylvania.



# U·S·S CREOSOTE OIL

USS

UNITED STATES STEEL




# ••• AVOID IT WITH THE R&IE *TTR-49*

## *Because R&IE has fortified the critical points*

### *Check the Facts*

**1 BLADE CONTACT**—which of necessity is a make-and-break. The Hi-Pressure design, generally adopted, is the most reliable for this critical point. Progressive thermal and momentary tests dictate the most effective construction—beryllium copper, with its inherent spring pressure and NO BACK-UP SPRINGS, plus copper fingers for high thermal capacity.

This highly perfected make-and-break contact IS MORE VULNERABLE TO HAZARDS THAN—A PROTECTED SEALED PRESSURE CONTACT

**2 HINGE CONTACT**—The R&IE sealed pressure Hinge Contacts eliminate the second make-and-break—and are always protected and clean. They are continuous, annular, constant electrical contacts—NO POSSIBILITY OF ARCING OR BURNING. More than twice the momentary rating of the switch fails to mark the contacts—THUS ELIMINATING ANY NECESSITY FOR INSPECTION. R&IE enclosed and protected contacts REQUIRE NO BY-PASSING OF ANY PART OF THE HINGE.

**BE PREPARED FOR TROUBLE AHEAD — SPECIFY TTR49**

**OTHER OUTSTANDING FEATURES**

**EXTRA SAFETY TERMINALS** with four half-inch bolts, 1200 Amps. and below.

**PROGRESSIVE BLADE MOTION** for smoother operation - minimum of parts.

**DRY ROTOR BEARING** for trouble-free operation. Stainless balls, weather-sealed.

**ADJUSTABLE LIMITS** for aligning blades and interphase rods.

**RIGID, STRUCTURAL CHANNEL BASE** Galvanized steel, as are all metal parts below current carrying parts.

**R&IE EQUIPMENT DIVISION**

I-T-E CIRCUIT BREAKER CO.

GREENSBURG, PENNSYLVANIA

CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS

DISCONNECTING SWITCHES INDOOR AND OUTDOOR

HORN GAP SWITCHES

INTERRUPTER SWITCHES

CUTOUTS AND THERMO-RUPTERS

DISTRIBUTION EQUIPMENT

SWITCH OPERATING MECHANISMS

SUBSTATIONS

OPEN OR ENCLOSED, ISOLATED PHASE HEAVY DUTY BUSES

KIRK INTERLOCK SYSTEMS

AUTOMATIC SWITCHING EQUIPMENT

METAL CUBICLES

TESTING DEVICES

Facts from
TENNESSEE

# "'CSP®' Transformer saves $125 per year in service calls"

"25 service trips for re-fusing during each lightning season, at a cost of about $5.00 per trip, was the price we had been paying to keep a single conventional transformer in service," reports a Tennessee Utility. "The transformer was located in a particularly severe lightning area, and we had come to accept the outages as somewhat pardonable. One day it was necessary to make three trips to restore service.

*"About 10 years ago we replaced it with a 'CSP' transformer which has been in continuous service ever since. Its record of performance, paying for itself within the first year, has resulted in our adoption of 'CSP' transformers for all rural construction."*

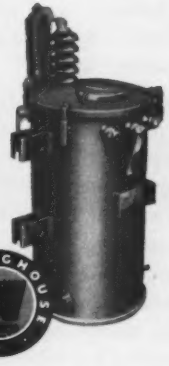
Installation and maintenance costs for Westinghouse "CSP" (Completely Self-Protecting) Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies shows the following:

**NATIONAL AVERAGES**

| | "CSP" | Conventional |
|---|---|---|
| Installation Costs | $13.87 | $24.74 |
| Burn-out Rate | 0.257% | 1.005% |
| Fuse Outages | None | 5.64% @ $6.52 per outage |
| Load Checks | Automatic | 12.8% |
| Breaker Reset | 1.02% | None |

If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet 4247-B, "Transformer Costs and Their Relation to Profits". Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

*"CSP" devices . . . originated and patented by Westinghouse*

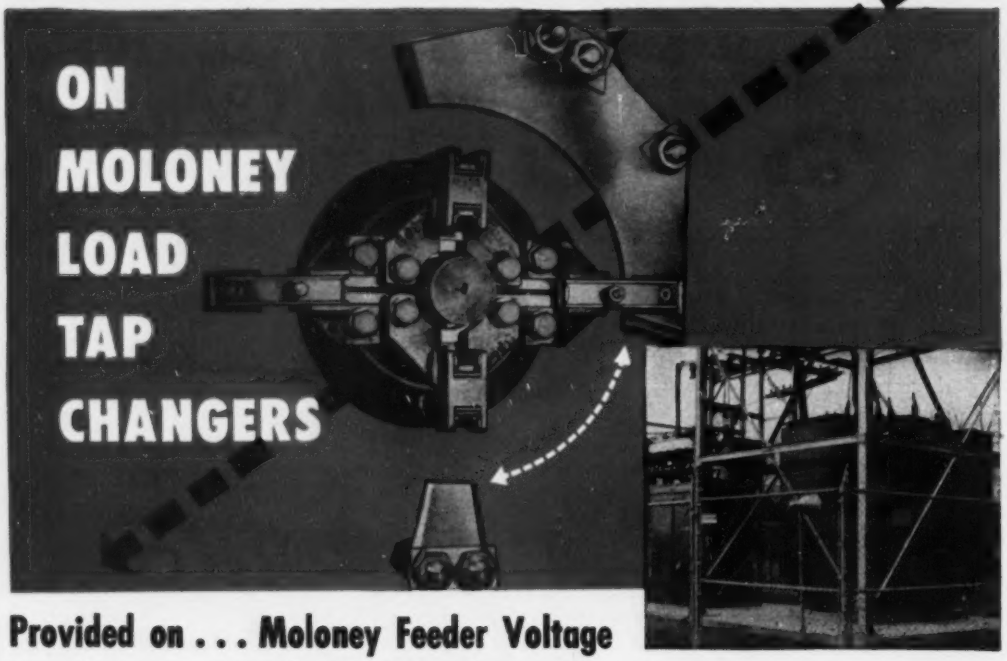



YOU CAN BE SURE... IF IT'S Westinghouse

"CSP" DISTRIBUTION TRANSFORMERS

J-70595

# GREATER ARC CLEARANCE...




## Provided on . . . Moloney Feeder Voltage Regulators • Regulating Transformers • Load Ratio Control Transformers

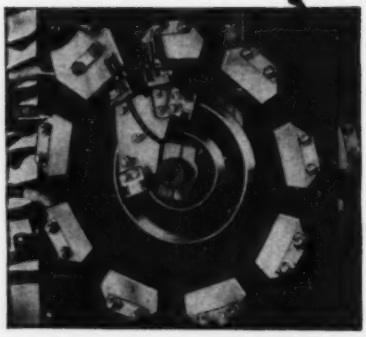
Load Tap Changers, provided on all Moloney Feeder Voltage Regulators, Regulating Transformers and Load Ratio Control Transformers, feature a Load Transfer Switch which relieves the Tap Selector Switch of all arcing duties and results in greatly increased arc interrupting capacity.

Use of the separate Load Transfer Switch permits longer arc clearances to be maintained since arcing duty is confined to but two stationary contacts per phase. This is in contrast to the nine stationary contacts per phase which are subject to arcing on regulators which require the Tap Selector Switch to break the load current.

This feature of the Moloney Load Tap Changer, along with the use of by-pass switching reactors, permits tap changing on a larger Kva load without increasing the physical size of the Load Tap Changing equipment. Maintenance costs are also reduced since arcing is eliminated from the Tap Selector Switch.

MEB1-14

## NO ARCING HERE...



No arcing duty is imposed upon any of the tap selector switch contacts, avoiding the necessity for replacement due to burning or scoring. Contacts are of hardened *copper alloy* to minimize frictional wear.

**MOLONEY ELECTRIC COMPANY**

*Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers • Step Voltage Regulators • Unit Substations*

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

# Sell . . . and Sell . . . and Sell

"The electrical industry must prepare itself now to meet a major change that lies ahead. This change is the one that will occur, perhaps precipitously, when we are forced to shift from comparatively easy disposal of our products and kilowatthours to one of aggressively selling the outputs of our enormously enlarged productive capacity." This is the sound advice of J. H. Jewell, vice-president, Westinghouse Electric Corp, in an article appearing in this issue of Electrical World.

"Instead of the industry estimate of 10 million kilowatts increase in the 1952 peak over 1951, we predict 5.6 million kw. . . . For 1953 we predict a growth of approximately 5 million kw. . . . With increased capacity of almost twice the load growth, reserve margins in 1953 will approximate 19% at the time of winter peak." This quotation is lifted from Electrical World's latest estimates also appearing in this issue.

Today sales of electrical appliances are holding up very well as indicated by growth in residential sales. But nevertheless the rate of increase is slowing up. Growth of small light and power sales is at a rate down to almost half that of a year ago. And large light and power sales will increase very little over the next few years.

These realistic evaluations of the situation ahead cannot be passed over lightly. They must be viewed from a constructive point of view, not shunned with the reception, "Too busy with other problems—let me alone."

The electrical industry must wake up to the potential dangers ahead. And as Jewell says, "The industry must be ready for it." And he adds, "That will take a bit of doing. It will involve major changes all up and down the line in the electrical industry so major that we must begin their planning without delay."

Electrical World believes that now is the time realistically to face the new problems that confront the industry. We agree with the statements of Mr. Jewell whose article is the kickoff for an industry program to stimulate activity.

No longer are there any excuses for holding back. It takes selling to assure an expanding industry and an expanding economy. And our industry as well as all industry must continue to grow if it and private enterprise are to survive in America. For our industry to succeed in its selling activities, the customers must feel the full impact of the cooperation and effort of manufacturers, utilities, distributors, contractors, retailers, and service organizations.

We submit for the industry's consideration the thinking of its leaders on this important subject in a series of articles, and we commend it as a program for action under the slogan: *Sell . . . and Sell . . . and Sell.*

# Electric Companies Versus Government Power

By B. L. England, president, Edison Electric Institute, as presented to the Rocky Mountain Electrical League, at Glenwood Springs, Colo., Sept. 10, 1952

**1.** Electric operating companies are distinctly local units, responsible to community needs and active in community improvement. In contrast, governmental power projects are responsible to centralized, bureaucratic authority, and local communities have small voice in their affairs.

**2.** Electric company trusteeship of electric supply in the public interest is carefully watched over by duly constituted local, state and federal regulatory commissions and agencies. But government power agencies are not subject to regulatory authority and make their own rules.

**3.** Electric companies provide millions of dollars annually in taxes to support government, while instead of providing tax support, government projects draw on the tax money of the nation to subsidize their activities.

**4.** Electric companies operate in the best tradition of the American enterprise system, an integral part of our heritage of freedom. But, government projects, if spread throughout the land as advocated by their supporters, would place the economic and social life of whole regions in the control of small groups of politically appointed administrators—gravely endangering American democracy.

**5.** Electric companies direct their energies to the improvement of electric service and the promotion of its use for the benefit of all their customers, increasing the ease with which they may develop—in business or otherwise—as free people. On the other hand, federal government projects which produce power and engage in other activities are able to exert a dominant influence over the people dependent upon them and seriously restrict free development whenever it suits the agency bureaucrats.

**6.** Electric companies pass on the benefits, of increased operating efficiencies to the public in the form of lower rates, in keeping with the economics of the business. But governmental projects set rates at politically pleasing levels and make up power costs with the aid of allocations to other activities and by drawing money from the public treasury.

**7.** Electric companies are owned by millions of stockholders in every walk of life and thereby contribute to the financial security of millions of Americans. But the nation's taxpayers finance governmental projects, whether they want to or not, and they have no direct vote or voice in how much of their money shall be spent or how it will be used.

**8.** Electric companies have an excellent management-labor record, offering fair wages, job security, and other benefits, thereby attracting the above-average personnel needed to assure fine electric service. But politics enters into any government activity, power project or otherwise, often prompting selection of unqualified, but politically acceptable personnel, and encouraging inefficient, even corrupt, operation.

**9.** Electric companies must earn enough on their investment to attract and hold the support of investors who, besides being owners of the business, are electric customers as well. To succeed in this, the electric companies emphasize efficiency, courtesy, and initiative in their operation so that the public will be pleased with its service. On the other hand, government enterprise does not have to pay its way; so waste, inefficiency, and stagnation are fostered along with a careless and indifferent attitude towards the people served who have no recourse beyond the government agency itself.

**10.** The electric companies' record of past achievement shows they have never faltered in living up to their responsibilities, and their plans for the future indicate even greater accomplishment in the years ahead. But the record of government-dominated enterprises shows that they have contributed practically nothing to the technical advance of the electric industry, that most advocates of government in the power business are moved by political and ideological considerations, and that in the future they hope to dominate the entire electric industry and with it the economic and social life.

# THE ELECTRICAL WEEK

**The Issue's News Highlights**—Herbert Hoover tells Centennial of Engineering engineers are needed in government to correct mistakes of politicians and statesmen.

In Washington a squabble is brewing between SEC and FPC over Donald Cook's proposed utility integration studies.

Charles E. Wilson proposes the people buy federal hydroelectric projects from the government and run them as private companies.

**Latest from Washington**—Sen Harry F. Byrd (D-Va.) launches informal probe into charges that lake bed of John H. Kerr reservoir has been improperly cleared and prematurely flooded by Army's Corps of Engineers . . . FPC sets Oct. 14 to resume hearings on Namekagon Hydro Co, Frederic, Wis., application for a license for 2,080-hp, $474,780 hydro project on Namekagon River.

New NPA Chief Richard D. McDonald will continue to participate in meetings of the Electric Power Coordinating Committee, but his deputy, Horace McCoy, will be the active NPA committee member. Other members: James F. Fairman, Depa, and James Williams, DPA.

For the present, Depa will rely on directives to keep power plant construction on schedule to meet AEC needs, rather than switch to use of AEC priority ratings for material to go into the plants . . . Cutting off the interruptible power is offsetting the electric energy shortage in the Pacific Northwest, and mobilization officials hope no further cuts will have to be made.

**Construction**—Long Island Lighting directors agree to accept Hempstead Town Board proposal for $160,000 on "Anderson Island" acreage desired by company for new power plant . . . Ohio Power begins clearing right-of-way for lines that will lead into new AEC plant in Pike County. By working five crews of 60 men each, 7 days a week, company expects to have lines ready in about 30 days.

**Financial**—Nesbitt, Thomson & Co is making a secondary offering of $10 million Winnipeg Electric first mortgage bonds 4% due in 1971 at 93.7? (4.5% yield) . . . Abbeville, La., citizens will vote Oct. 7 on whether their system should be sold to Gulf States Utilities for $1,250,000.

**Labor**—Rejecting General Electric's offer of pay raises ranging from 7½¢ to 13¢ an hour (which has been accepted by 60 other unions including UE), IUE-CIO's GE Conference Board approves plan for its electrical workers at GE to take a strike vote Sept. 29.

**Rates**—As result of new contract between Consolidated Edison and City of New York, charges for electricity to light city streets and public buildings will increase almost $2 million a year, says Dominick F. Paduano, Commissioner of Water Supply, Gas & Electricity.

**Consolidated Edison** has taken title to 110 acres of land adjacent to Staten Island Edison's property on which the Arthur Kill generating plant is located.

**From New England**—Haverhill (Mass.) Electric has submitted plans to City Manager D. E. McLean for new street lighting of mercury vapor type in downtown area . . . Public Service of New Hampshire's second 40,000-kw unit at Schiller station is scheduled for service late this fall.

**From the Southeast**—Florida P&L gets 30-year franchise in Live Oak. City Commission Pres H. L. Gilmore says company would give community 6% of gross sales yearly and that this would mean $500,000 for civic improvement over the 30-year span.

**From East North Central**—Antioch Power Co, serving Linton, Ind., will quit business in about 90 days because of high operating costs. Officials of Public Service of Indiana are planning to supply the town with power.

**From West North Central**—Whiting, Iowa, citizens vote 239-to-37 to grant a 25-year electric franchise to Iowa Public Service. Citizens also voted 235-to-39 to sell Whiting municipal plant and distribution system to IPS.

**GE Pres Ralph J. Cordiner** announces company has taken options on site in Mt. Pleasant north of Valhalla in Westchester County, N. Y., as a future location for a building to house company's executive offices . . . Babcock & Wilcox Co buys facilities of former shipyard from Brunswick Port Authority at Brunswick, Ga., and will convert it into a plant to build boilers.

**From the Far West**—"While in 1950 the Pacific Northwest region accounted for 7% of nation's electric production for public use, region will require an estimated 12% of nation's energy by 1975," Bonneville Power Administrator Paul J. Raver recently revealed . . . Grays Harbor PUD has adopted a resolution consenting to purchase of Puget Sound P&L's properties in Grays Harbor County by Thurston County PUD, one of the participants in proposed overall purchase of Puget Power properties (see page 115 of this issue).

**From West South Central**—Three remaining ice properties of Community Public Service will be leased to and operated by Crystal Dairy Products, Gainsville, Tex., a company-owned subsidiary, as the result of recently made changes. Properties are at Pecos, West Columbia and Gainesville.

**Alcoa's** proposed aluminum reduction plant in Alaska has the approval of Department of Interior "in general" but the department wants to be certain that no monopoly will result, Secretary of Interior Oscar Chapman says.

**Roberta Development Co,** Ocean City, N. J., has under construction 25 "all-electric" houses of which 19 have been sold. Each house is to be a three bedroom dwelling and will have seven panels as the complete heating system. Land has been acquired for another 70 homes.

**Congratulations**—Arkansas P&L elects Robert E. Ritchie president, succeeding C. H. Moses who becomes chairman. Ralph H. Teed is named vice president of operations.

# WASHINGTON COMMENT

JESSE MOCK

### Public Power, With a Difference

A few phrases from a recent speech by the Democratic Presidential candidate imply a marked contrast with the present administration's attitude toward public matters.

Take these from Adlai Stevenson's Seattle address:

". . . Our emphasis must be not on rivalry of conflict but on cooperation."

"We must be eagle-eyed and tight-fisted about these expenditures."

"The return of the (federal) investment must be real, not hypothetical."

"I believe with all my heart that the job . . . is very largely a job for private action."

These quotes do not pretend to carry the full idea of that spech, but do indicate ideas differing in large degree from the campaign speeches this year and in 1948 of President Truman.

In the same speech, Stevenson upheld many of the basic power policies that have characterized the Roosevelt-Truman Administrations. He paid homage to the men who had fought to build the large federal power projects in the Northwest. He supported the preference clause. Inferentially, he seemed to favor a government-built Hells Canyon Project on the Snake River in Idaho. Furthermore, Stevenson said he believed the government should build huge hydroelectric projects which are beyond the capacity of free enterprise to construct.

**It Depends on Your Point of View . . .** The cynical view would be to accept Stevenson's attitudes and new ideas as merely campaign embroidery designed to catch an even larger number of votes than Truman did. The fine hand of his advisor, Interior Secretary Oscar L. Chapman, is certainly evidenced in some passages of the speech. But Stevenson seems to have kept intact most of the basic philosophy he expressed before he became the Democratic standard bearer.

There is none of the open hostility toward electric companies Truman has abundantly displayed. There is much less of the government paternalism Chapman advocates. If Stevenson can be classified as a public power advocate, he certainly carries the tag less impetuously than, say, many of the leaders of the Electric Consumers Conference which met in Washington last May.

Since Stevenson accepts the present policy as Democratic dogma, how then does he propose to bring his own attitude into play should he reach the White House? He gave a few hints in the Seattle speech:

- He proposes better administrative arrangements within the government for coordinating the federal role in public works.
- He calls for intelligent and coordinated action by the states, by localities, and by private enterprise.
- He calls for stricter review of the projects which the federal government is to undertake. "The magic phrase 'engineering feasibility' and the blessing of the local interests are not enough to justify a public project."

**The Challenge Has Been Thrown to Ike . . .** Republican candidate Dwight D. Eisenhower, who has no more than touched on the subject thus far, will be hard-put to offer a more constructive approach toward settling some of the bitter conflicts that are a part of the public power controversy.

True, Eisenhower is not saddled with present Democratic policies. He can accept or reject them as he chooses. But few politicians venture to suggest the repeal of two decades of U. S. government, no matter which party is in power. More likely the Republican nominee will also offer a new approach rather than new policies.

In the end the thing that really counts is the sincerety of the candidate. Stevenson's refined prose means nothing unless rigidly applied. Unless Stevenson personally took the helm, Interior Department could sail lustily along its present tack, conned as now by a second in command.

# TECHNICAL NOTES

ARCHER E. KNOWLTON

**Experienced operators** made proportionately six times as many errors as new men on one system. Training and education are not sufficient. Caution must never be relaxed. It must be a habit.

**Calcium** added to lead for battery plates permits higher specific gravity electrolyte, elimination of trickle charge. However the battery is more vulnerable to overcharge.

**Stainless steel** has justified its greater cost for (solid) Francis wheel runners, wicket gates, facing plates and wearing rings because it reduces maintenance and outage.

**Machine tools** are futile to build frantically for defense unless there will be the motors available to drive them.

**Maintenance** has absorbed only ½ % of the saving credited to reheat for the 80 Mw units at Port Washington. It amounts to only 4.3% of total annual fuel cost.

**Tin coating** in thickness down to 1/100 mil can be measured to 10% accuracy by radioactive means.

**Gas turbines** using natural gas from the pipelines threaten to supply the pumping power. They can be made large in hp with high rotative speed appropriate for centrifugal compressor drive. Further it offers an inherent increase in capability in cold weather when gas demand is greatest.

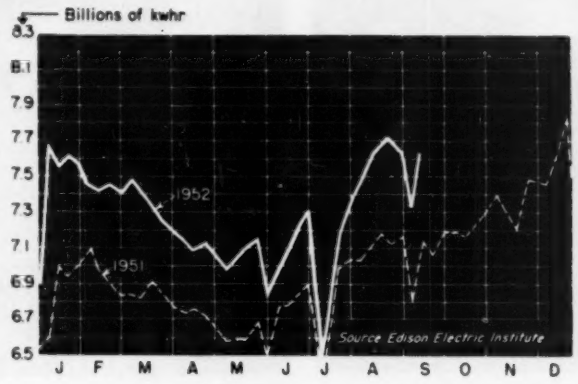
**Inhibitor** in circuit breaker oil seems to retard settling of the carbon produced by prior interruptions.

**Reinjection** of imperfectly combusted ash is facilitated by a decantation type of dust collector which segregates the larger particles with high carbon content for the reinjection.

**Capital cost** to provide 10.8% of generating plant reserve for one system was determined to be some six times that of an interconnection increment adequate for comparable performance.

**Water** from city systems is actually cheaper than dirt. Typical rates result in costs of 5 to 10 cents per ton used.

# STATISTICS




## Output Week Ended Sept. 13—7,654,324,000 Kwhr

Per Cent Change From Previous Year

| | Total US | New Eng. | Mid. Atlan. | Cent. Ind. | West Cent. | South-east | South Cent. | Rocky Mount. | Pacific NW | Pacific SW |
|---|---|---|---|---|---|---|---|---|---|---|
| Sept. 13 | +7.2 | +7.1 | +3.4 | +6.8 | +9.9 | +12.3 | +9.4 | +13.7 | −2.3 | +7.4 |
| Sept. 6 | +7.8 | +8.6 | +6.2 | +6.1 | +8.5 | +11.4 | +1.7 | +15.8 | +5.6 | +11.8 |
| Aug. 30 | +7.0 | +7.4 | +3.5 | +3.2 | +7.6 | +10.1 | +9.8 | +21.1 | +7.4 | +9.1 |

## Electric Power Statistics

| | | Latest Month | Preceding Month | Year Ago |
|---|---|---|---|---|
| Peak Load (Million Kw) | June | 67.0* | 65.9 | 62.4 |
| Capacity (Million Kw) | July | 77.96 | 77.46 | 72.70 |
| Production (Billion Kwhr) | July | 32.52 | 31.53 | 30.39 |
| Hydro | | 8.74 | 9.16 | 8.28 |
| Fuel | | 23.78 | 22.37 | 22.11 |
| Fuel Consumption | | | | |
| Coal (Million Tons) | July | 7.90 | 7.66 | 8.08 |
| Oil (Million Barrels) | | 4.38 | 3.91 | 4.43 |
| Gas (Billion Cu Ft) | | 98.71 | 89.29 | 83.20 |
| Sales (Billion Kwhr) | June | 27.67 | 27.94 | 26.66 |
| Residential | | 7.44 | 7.52 | 6.63 |
| Commercial | | 5.00 | 4.74 | 4.55 |
| Industrial | | 13.20 | 13.83 | 13.55 |
| Other | | 2.03 | 1.86 | 1.93 |
| Net Income Class A & B Companies ($ Million) | July | 64.52 | 69.88 | 56.11 |
| Estimated Dec. 52 Peak (Million Kw) | May | 80.0 | 80.2 | 78.8 |
| Kwhr per Residential Customer (12 Month Average) | June | 2,091 | 2,078 | 1,921 |
| Revenue per Kwhr Residential Service (12 Month Average) | June | 2.78¢ | 2.78¢ | 2.84¢ |
| Canadian Production (Billion Kwhr) | June | 4.99 | 5.33 | 4.71 |

## Business Statistics

| | | | | |
|---|---|---|---|---|
| FRB Industrial Production Index††† | July | 192* | 204 | 214 |
| Gross National Product Annual Rate ($ Billion) | 2ndQtr. | 343.2 | 339.4 | 329.3 |
| E. W. 5 Industry Production Index | June | 96.9* | 116.0 | 123.2 |
| ENR Construction Cost Index†† | Sept. | 122.9 | 122.7 | 113.8 |
| BLS Consumer's Price Index | July | 190.8 | 189.6 | 185.5 |
| NEMA Insulation Materials Sales Index† | June | 500 | 517 | 610 |
| NEMA Electric Appliance Sales Index† | June | 258 | 219 | 284 |
| NEMA Household Refrig. Sales Index† | June | 192 | 128 | 154 |
| Metal Prices. (Sept. 16) | | | | |
| Copper, Conn. V., lb | | $ .24½ | $ .24½ | $ .24½ |
| Lead, N. Y., lb | | .16 | .16 | .17 |
| Zinc, prime Western E. St. Louis, lb | | .14½ | .14 | .17½ |
| Tin, Straits, qual. N. Y., lb | | 1.21½ | 1.21½ | 1.03 |
| Aluminum, ingot, base price | | .20 | .20 | .19 |
| Nickel, base price | | .56½ | .56½ | .56½ |
| Steel, billets, Pitts., ton | | 59.00 | 59.00 | 56.00 |
| Steel, scrap, No. 1 heavy, Pitts., ton | | 45.00 | 45.00 | 45.00 |

* Estimated. † 1936=100 †† 1949=100 ††† 1937-39=100 (Unadjusted)

## Utility Fuel Stocks and Consumption

Stocks of coal on hand at electric utility power plants on August 1 totaled a record 41.08 million tons. This, the Federal Power Commission reports, is 12.2% more than stocks a year ago, and 0.4% above stocks on hand July 1.

Based upon the July rate of consumption, coal stocks on hand at electric utility power plants on August 1 were sufficient to last 161 days compared with 160 days a month earlier and 141 days a year ago.

Stocks of fuel oil on this date totaled 13.1 million barrels. Based upon July use, these were sufficient to last 93 days compared with 101 days a month before and 83 days a year ago.

Consumption of coal and estimated coal equivalent of other fuels in July amounted to approximately 13.05 million tons, an increase of 3% over the preceding July compared with an increase of 6.8% in fuel generation.

Indicated July rate, for combustion of coal only, was 1.10 lb per kwhr compared with 1.15 lb per kwhr a year earlier.

**Stocks and Consumption of Bituminous Coal and Lignite**

Millions of Net Tons—July 1952

| | End of Month Stocks 1951 | End of Month Stocks 1952 | Monthly Consumption 1951 | Monthly Consumption 1952 |
|---|---|---|---|---|
| Electric utilities | 31.64 | 35.90 | 7.74 | 7.60 |
| Coke ovens | 14.04 | 16.09 | 9.55 | 3.16 |
| Steel and rolling mills | 1.17 | 1.20 | .53 | .23 |
| Cement mills | 1.32 | 1.46 | .70 | .60 |
| Other industrials | 19.67 | 19.46 | 6.58 | 6.10 |
| Railroads (class I) | 4.43 | 3.56 | 4.06 | 2.34 |
| **Total industrial** | **72.23** | **77.65** | **29.16** | **20.04** |
| Retail dealer | 1.85 | 1.66 | 3.47 | 3.22 |
| **Total** | **74.10** | **79.31** | **32.63** | **23.26** |

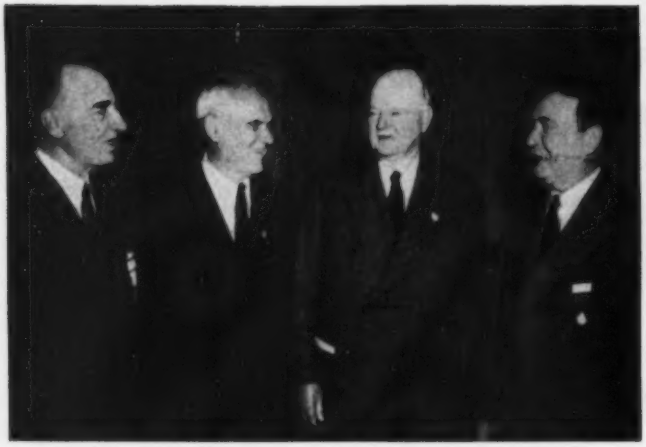
Source: Bureau of Mines

Electric utility power plants consumed 7.90 million tons of coal in July. This is a decrease of 2.2% from the 8.08 million tons consumed during July a year earlier, but a 3.1% gain over the consumption of the preceding month.

Use of gas amounted to 98.71 billion cubic feet during July. This is the highest monthly gas use on record and represents a gain of 10.5% over the record set during the preceding month.

July use was 18.6% above that of July 1951.

Fuel oil consumption during July totaled 4.38 million barrels, 1.2% below July 1951.



**CENTENNIAL'S** principal speaker was Herbert Hoover, second from right. He's shown talking with Centennial President Lenox R. Lohr; Hoover Medalist Clarence D. Howe, Canadian trade minister; and John Fritz Medalist Benjamin F. Fairless, president of United States Steel

**NUCLEAR POWER** discussion had Alex D. Bailey, ASME past president as chairman and AEC's Alfonso Tammaro as chief speaker

# Hoover Calls on Engineers to Govern

## Former president tells Centennial of Engineering they may save the world from the errors of politicians and statesmen

America today may be on the threshhold of greater advances than ever before, Herbert Hoover recently told the engineering profession in Chicago.

He spoke at the ten-day Centennial of Engineering that drew more than 25,000 engineers to Chicago to celebrate the 100th anniversary of the American Society of Civil Engineers.

The former President predicted that future advances will come from research teamwork on the greatest scale in history. Pointing out that engineers have become essential to industrial administration, he said engineers in government may save the world from errors of politicians and statesmen.

Hoover Medalist Clarence D. Howe, Canadian Minister of Trade and Commerce and Defense Production, shared the view that the engineer's voice must be heard and his presence felt in government. Neither men nor nation, he said, can afford to remain unconcerned about the lives of other men or other nations. A nation cannot survive on technological superiority alone—it must also have proper national policies, he commented.

**Scientists in Government . . .** Col Lyndall F. Urwick of London, who gave the Calvin W. Rice Lecture before the American Society of Mechanical Engineers, said that the hope of humanity today lies in the development of scientific thinking about government.

"We have to redesign our political and social thinking to accord with . . . a culture based on power-driven machinery," he said.

He added that American engineers were the first to apply scientific methods to business management.

Technical meetings were held by 37 societies as their participation in the Centennial. Among them were the American Institute of Electrical Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, and the Illuminating Engineering Society.

**Nuclear Power Predicted . . .** Engineers and utility companies cannot afford to neglect developments in the field of nuclear power, Alfonso Tammaro, manager, Chicago Operations Office, Atomic Energy Commission, told the American Society of Mechanical Engineers' session. Power can be produced at a competitive cost, he said, provided a portion of the cost is borne by the sale of plutonium to the government for military purposes (EW, In the Industry, Sept. 15, p 6).

According to an ASME progress report presented by Lee Schneitter, Ebasco Services, European gas turbines are noticeably larger than those being installed in the U. S. One 27,000 kw unit is operating in Switzerland and a 20,000-kw unit has been built for installation at Weinfelden, Switzerland. Several 15,000-kw and many smaller units have been built. While American gas turbines to date burn either gas or oil, several English units have been built to burn coal or peat.

Pressurized furnace operation is at an intermediate stage, G. W. Bice of American Gas & Electric Co told ASME. Better heat rate is being obtained and appreciably lower investment costs should be possible when reliability permits induced draft fans to be eliminated.

Despite operating troubles experienced during early development, outdoor power plants today are quite successful and economical, H. G. Hiebeler, Houston Lighting & Power Co, told the ASME group. Plants are being built for under $100 per kw, he said, and operating and maintenance employees have come to prefer working outdoor plants.

Early problems of moisture in motors and freezing of small lines have been solved through improved design of motors for outdoor operation and

the use of heating cables to prevent freezing of lines temporarily out of service.

E. C. Duffy, Long Island Lighting Co, reported satisfactory experience with two semi-outdoor units. He announced plans for the installation of three additional 100-Mw units of this type by his company.

**Power Trend . . .** Greater use of power and heavier concentration of loads are among the factors causing the present upward trend in size of generating units, according to A. A. Johnson, Westinghouse Electric Corp. He addressed an AIEE session. He disclosed that an order had been accepted within the last few weeks for a unit of 250,000-kw capacity and that 300,000-kw, single-shaft, 3,600-rpm generating units are already being contemplated.

Hydrogen pressures have been ½ psi to 15 psi, Johnson said, but now 25 psi is an immediate prospect and 45- to 60-psi seems possible in the not-too-distant future.

The upward trend of voltage from 4-kv in 1892 to 288-kv in service and 330- to 400 kv under construction today was traced by S. B. Crary, General Electric Co; I. W. Gross, American Gas & Electric, and C. F. Wagner, Westinghouse. They cited several important milestones in today's movement to higher voltage transmission:

- Adequate lightning protection, which has reduced the flashover of lines and equipment to a very low incidence
- Symmetrical components, calculating devices, and analytical methods that have permitted solution of stability and protection problems
- Improved conductors and insulators and development of high voltage underground cables to go along with transmission needs.

Further extension of extra high voltage transmission was predicted, as was standardizing on voltages recommended to facilitate interconnections between systems.

Reduced basic insulation levels, with accompanying savings in costs, will be possible through refinement in lightning protection practices and operation with closer tolerances, K. B. McEachron of General Electric said. Proper use of the reduced arrester is necessary for this transmission development, he added.

Average loading of distribution transformers has been increased 40% on the Commonwealth Edison system in the past 13 years through careful study of temperature conditions, load characteristics and equipment capabilities, Herman Halperin of Commonwealth Edison Co reported. Increases in loadings of other equipment resulting from these studies include: 12 kv lines 20%; substation transformers, 20%; and generators, 10%, he said. As a result of this program there has been a small increase in maintenance and service failures but no particular effect on service reliability. Appreciable savings in investment costs have resulted.

The solution of our problems will depend upon the scientists and engineers who find new ways to use electric power, F. R. Benedict, Westinghouse, told AIEE engineers. In spite of labor shortages, productivity must increase 45% in the next ten years to maintain a balanced economy. Much closer coordination will be necessary among research, design and production. New materials must be applied, and old materials studied in terms of service life requirements, to stretch the available supply of critical materials.

## New NPA Chief

Richard A. McDonald, San Francisco industrialist, has been named administrator of National Production Administration. He succeeds Henry H. Fowler, who is now head of the Office of Defense Mobilization. (EW, Sept. 15, p. 10).

## Engineer Lack . . .

### . . . is discussed at manpower conference. Full utilization of technical skills urged

Engineering Manpower Commission of the Joint Engineering Council discussed a program to insure fullest utilization of engineering skills in industry and military service at a recent conference held in conjunction with the Centennial of Engineering at Chicago.

The commission's chairman, Carey H. Brown, underscored the need for withholding from the military service pool men with high technical and professional qualifications and a number of qualified trainees. These men, he said, are needed in industry if this country is to maintain its superiority in the productive fields.

But the prospect is for more, not fewer, engineers in the uniform of their country, Col. J. D. Griffing of Selective Service told the conference. He said an increasing number of engineers will be taken into military service in the coming months.

Griffing declared that engineers could not expect special privileges in the form of deferment or exemption from military service.

Utilization and pay of engineers is the key to getting and keeping men in this field said another speaker, Henry J. Taylor, economist, journalist and radio commentator, in his analysis of the problem. Taylor expressed the opinion that if war is to be discouraged it must be done on the technological advantages and superiority of United States.

## 250,000-Kw Steam Units Ordered for TVA Plant

Tennessee Valley Authority has ordered two 250,000-kw steam turbine generator units for its Gallatin Plant near Nashville, Tenn. The units will be built by Westinghouse Electric Corp and will be the largest single-shaft turbo-generators ever manufactured.

The 3,600-rpm triple-exhaust turbines will be designed for steam at an initial pressure of 2,000 psi, and at 1,050 deg F with reheat to 1,050. The generator rotor and stator will be inner-cooled.

# Sell Public Dams . . .

## . . . Wilson urges government, as a means to reduce debt, give citizens a share in America

The federal government was asked last week to get out of the power business by selling its dams, generating equipment, and distribution facilities to private citizens.

In making the proposal, Charles E. Wilson, former director of the Office of Defense Mobilization, declared the government would be able to lop off 10% of the national debt and Americans would be given a chance to own a share in their country.

The former president of General Electric Co is the first person close to the electric industry to advocate openly that the government sell its power facilities to private industry.

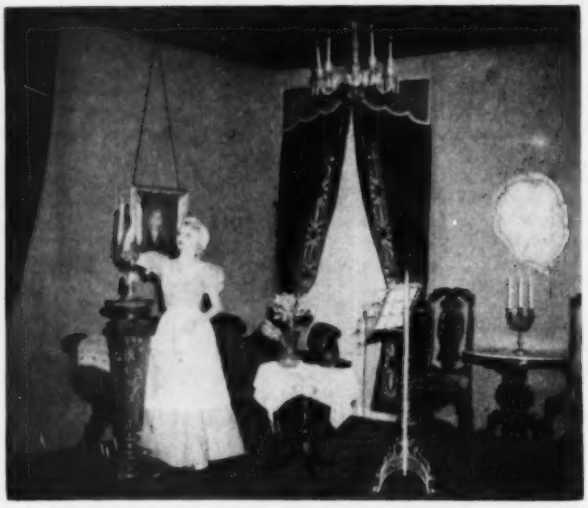
**Reduce the Debt . . .** Wilson made his proposal in a speech in New York at a luncheon celebrating Railroad Week. He said sale by the government of its power projects would reduce the national debt by $27 billion, decrease interest payments on the debt by $500 million annually, and bring in new taxes amounting to $1 billion yearly.

The main purpose of his proposal, however, he said, "is to let all Americans who can and will, buy a share of stock in America, of their own free will—to make them stockholders in the true sense of exercising both choice and control, instead of being forced as taxpayers to finance undertakings beyond their choice and control."

**Sound Businesses . . .** Wilson stated the federal projects were sound businesses serving a public need. "We have never argued the need—just the method," he said. "But they are operating under the 'big government' concept, which has never in history proved itself an intelligent and efficient operator of any business."

The potential buyers of the government's power properties, Wilson said, are the people who own government bonds. He suggested they could turn in their bonds for shares of stock in new companies to spring from the federal plants.

He asserted that the new shareholders would get a better return from their stock than they now get from their bonds.



**The old way of lighting . . .**

# IES Conference Focuses

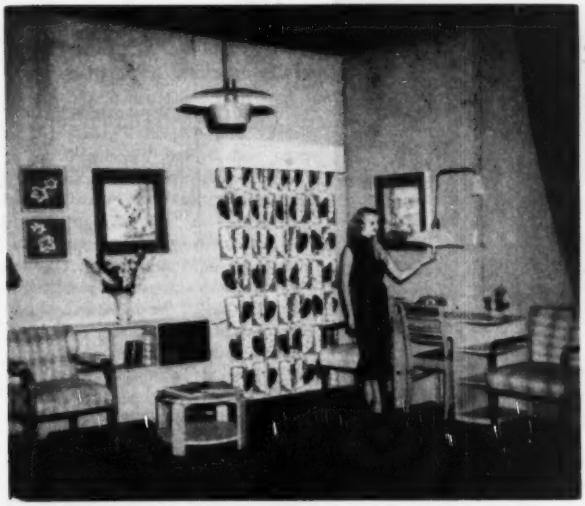
Interior illumination and residence lighting were featured at the National Technical Conference of the Illuminating Engineering Society in Chicago, Sept. 8-12.

IES President, Samuel G. Hibben, Westinghouse Electric Corp, stressed the need for directing more society activity toward the care of human eyesight. He said the increased burdens placed upon the eyes in a civilization that uses them with increasing tempo makes this vitally important. Each year Americans spend five million dollars on eye cosmetics and less than one million dollars on medical eye research, he said.

Expansion of lighting research and education far beyond our present concepts was urged by IES President-elect E. M. Strong, Cornell University. Professor Armstrong urged that the society provide high leadership and funds for finding, organizing, and applying the knowledge we lack in so many aspects of light engineering.

H. HERBERT MAGDSICK, GE, left, receives IES Gold Medal and plaque from President Samuel G. Hibben

HIBBEN, who received hat from western admirers, offers a hand to President-elect Everett M. Strong



. . . and the new are reviewed as . . .

# on Interior Illumination

**Parade of Lighting Progress . . .** A report of lighting progress by T. C. Sargent, Sylvania Electric Co reviewed advances during 1951-1952 in light sources and equipment. The report included a stage presentation (see pictures, above) showing old and new methods of home lighting. One new development demonstrated was a General Electric electronic control for dimming fluorescent lamps. This will permit the use of these highly efficient colored lamps in places where control of brightness is necessary. The system consists of a dimming control unit and especially designed matching ballast.

The residence lighting session featured papers covering lighting problems in recreation rooms, bathrooms, kitchens, etc.

Fluorescent or incandescent lighting units located on either side of a mirror furnish the best lighting for full viewing, according to Edith Buchholtz, Westinghouse. Structural lighting in the home requires skilled lighting design consultation as well as advance planning, coordination of interior finishes and a flexible budget, said Aileen M. Page, GE.

A new rapid starting fluorescent lamp and ballast system was discussed by A. E. Lemmers and W. W. Brooks, GE. They said it offers high quality fluorescent lighting with considerable reduction in ballast material.

**New Type Ballast . . .** A new lead-lag ballast for discharge lamps was explained by C. H. Burns and H. E. Bachman, Westinghouse. The new design has the advantage of series sequence-start ballasts. It is smaller in size in certain ratings, weighs less and has lower losses and cost than conventional lead-log ballast.

A Lighting Service Forum brought together winners in the society's regional contests. Each presented their "Most Interesting Lighting Job." Prizes were awarded on the basis of interest, application of engineering principles, effectiveness of solution, originality of technique and method of presentation. First prize went to E. R. Domoney, Consumers Power Co, for his "Relighting of a Church." Second prize went to H. S. James, Duquesne Light Co., "Relighting of a Syrian Mosque." Third prize winner was H. N. McIntyre, GE, "Fluorescent Floodlighting for an Airport."

"MY MOST INTERESTING LIGHTING JOB" contest drew these men: (standing) Lee E. Taylor, contest chairman; H. N. McIntyre, GE; C. H. Johnson, Johnson & Johnson, engineers; Paul Hildebrand, Pennsylvania P&L, vice chairman; (seated) H. S. James, Duquesne Light; Lt Col J. W. Howard, USAF; and E. R. Domoney, Consumers Power, the winner. At right, judges at work.

FIVE-MAN GROUP has been named by SEC to direct utility integration studies. They are (l to r) seated, J. A. Pines, chief of section on Public Utility Integration; J. S. Katzin, director of Public Utilities Division; and W. H. Rudisill. Standing, R. E. Johnson and L. H. Ware

# 'Integration' Rift Develops

## FPC has handed SEC a staff report that takes issue with Donald Cook's plan for area-wide utility studies

A family squabble is developing between federal regulatory agencies over utility integration studies.

In a detailed staff report, Federal Power Commission has sought to sprinkle cold water on the burning enthusiasm with which Securities and Exchange Commission is undertaking its public utility integration studies (EW, Aug. 18, p 8).

**Cautious . . .** With election-year caution, most commissioners in both agencies want to keep the fuss out of the public eye. Chairmen of SEC and FPC refuse to disclose contents of the FPC comments, but FPC chairman Thomas C. Buchanan said he hopes to arrange a conference between the two agencies to discuss the integration studies. He insists that relations on the matter are "cordial."

Chairman Donald C. Cook of SEC has no comment on the FPC report, which was transmitted to him along with a letter from Buchanan. However, unless he does clear up some questions raised in the report, he can probably expect a running attack from FPC as he proceeds with the studies.

As proposed by Cook, SEC would make area-wide studies on the possibility of combining or integrating utilities systems with the view of obtaining the most economical operation. FPC exercises regulatory powers over a wide area of interstate gas and electric utility systems, and collects vast amounts of information for its own and public use.

The FPC staff report discussed the following questions:

- Does SEC have all the legislative authority it needs to conduct such studies, and would they not conflict with or duplicate many of the duties now being carried out by FPC?
- How much room is there for the sort of integration that Chairman Cook has described? FPC points out that 26 power pools in the country supply about 90% of the nation's requirements. Of the 4,000 systems, says FPC, about 300 generate 96% of the nation's electric energy. A large number of interconnections urged by FPC or other agencies have been made.

There is also the real question as to whether Congress will appropriate money to carry on the SEC studies.

A copy of the FPC staff report has been sent to the budget bureau which is studying proposals of the agencies for 1953 operating expenses.

# Fifth Industry Team

## AEC approves Pioneer Service-Foster Wheeler proposal to study nuclear generation

A fifth industry team—Pioneer Service and Engineering Co of Chicago and Foster Wheeler Corp of N. Y.—will undertake feasibility studies of nuclear-fueled generation of electric power.

Atomic Energy Commission has accepted a Pioneer Service-Foster Wheeler proposal and is now negotiating details of the agreement. Four other teams have already completed similar studies and are reported to be generally optimistic about the future of privately financed atomic power plants (EW, July 14, p 118).

**Second Phase . . .** One of these teams —Detroit Edison-Dow Chemical—is already at work on the second phase of its study after receiving AEC approval. Reports from the other teams are now being considered by AEC. Each of the three teams is understood to be prepared to continue its studies for a second year if AEC gives the go-ahead.

Six other firms or groups have also responded to an AEC invitation to enter upon the studies, but the Pioneer Service-Foster Wheeler proposal is the only new one submitted in sufficient detail for thorough evaluation, AEC said.

As under the four previous agreements, all costs of the first-phase of these studies will be borne by the companies with the exception of the cost of time and effort by AEC and its contractors.

**No Report . . .** AEC supposedly retains authority over distribution of reports and inventions and discoveries made in the course of the studies. However the agency has thus far shown no tendency to publicize any portions of reports which already have been submitted.

Security clearance is to be granted, after investigation, to a sufficient number of qualified representatives of each firm or group of firms approved for activity in the second round studies to carry out its survey.

Main goal of the study is to determine the feasibility of design, construction and operation by private industry of power-producing reactors.

## FINANCIAL

# Puget Sound Board OK's Sale

### Stockholders' approval is needed before properties are transferred to PUD's. Election set for late October

Stockholders of the Puget Sound Power & Light Co will vote in late October on proposed sale of most of its properties in Washington State to six PUD's for $89,490,000, as a result of action by the company's Board of Directors (EW, Sept. 15, p. 43).

Excepted from the sale are the company's distribution facilities in Whatcom County, the Whatcom PUD refusing to become a party to the transaction.

**Best Solution . . .** The board voted to accept the offer, described by Pres Frank McLaughlin as "under existing intolerable conditions, the best available solution of the critical power problem in the company's territory, in that its objective is an assurance of adequate and reliable electric service at the lowest possible rates on a home rule basis."

The PUD's, who earlier had voted to extend the offer, with dissenting votes by only two of the 18 commissioners, are Chelan, Jefferson, Kitsap, Skagit, Snohomish, and Thurston. J. W. Bryan, Sr., of Kitsap, one of the dissenters, called the purchase "an impossible and outrageous contract swindle."

"As things stand at present," declared McLaughlin in a statement after the board had voted to recommend acceptance of the purchase offer, "the economy and well-being of the people in the area served by the company are being jeopardized and menaced year after year by a critical power shortage, and another brownout is threatened. The public interest demands prompt action to remedy such a tragic state of affairs, and the proposed six-district acquisition is clearly an important step in this direction."

**About $22 a Common Share . . .** "It is contemplated that an initial liquidating distribution of around $22 per share of common stock will be made available to the stockholders within 30 days after consummation of the sale. The company will then have principally the Whatcom County properties and the Diamond Ice & Storage Co yet to liquidate," Puget's president said.

McLaughlin pointed out that "approximately 14% (2.6 million) of the company's total electrical revenue for the 12 months ended July 31 came from the Whatcom County properties," which the company plans to operate until "a satisfactory disposition is made."

He believes that total distributions to stockholders after the sale of all properties may total as high as $27 per share of common stock.

The power company president announced that "all personnel, except executive officers, employed by the company on the closing date in connection with the properties to be purchased, are to be retained by the districts and qualified under a pension plan."

**Approval by 66 2/3% . . .** Puget Power has 2.2 million shares of common stock outstanding, owned by 14,000, with one vote for each share. The sale must be aproved by 66 2/3% of the total stock outstanding.

The company would receive, in addition to the purchase price, about $3.5 million for accounts receivable, materials and supplies, plus net additions since June 30 to date of closing.

The six PUD's, in a letter accompanying their purchase offer, said they would press condemnation proceedings if the purchase plan falls through. If the purchase plan is approved, they will inherit condemnation suits brought against various parts of the property by Tacoma and other municipalities.

"It should be apparent to your corporation and your stockholders," said the PUD letter, "that with so much publicly produced power distributed in this state at no profit, there is no future here for a privately owned electrical utility whose operations must necessarily be premised upon the distribution of power at a profit."

The PUD's plan to issue revenue bonds totaling $107 million to finance the purchase and cover acquisition costs, current assets, working and construction cash and a proposed pension plan for employees.

Snohomish and Chelan PUD's, which already own their distribution systems, each will issue bonds for $11,202,000 under the purchase plan, this amount representing a one-sixth share in the "production pool," which includes the Rock Island, Baker River, White River, Snoqualmie and Electron hydroelectric dams, the Shuffleton steam plant near Seattle, the transmission system serving the entire area and the distribution systems in King, Pierce, and Kittitas Counties. The Kittitas PUD later would buy the system in its county while PUD's would have to be formed in King and Pierce counties.

In the four other districts, the purchase will include a one-sixth share in the production pool, plus the distribution lines within the county.

# FPC Rate Policy

### Commission withholds decision at present on treatment of accelerated amortization

Federal Power Commission has declined to say at this time how it will treat rapid tax amortization in connection with its rate-making duties.

An order delivered early last week dismissed an application by Panhandle Eastern Pipeline Co for a declaratory order in the matter. FPC indicated the decision will be made when it acts on a Panhandle rate increase application now pending before it.

**Probable Guide . . .** Action on the Panhandle rate case should indicate how FPC will treat similar rate increase applications by electric utilities. Furthermore, the rate decision may influence various state commissions which have not yet faced the rapid amortization factor in rate regulation.

Primary effect of the rapid amortization of costs of defense facilities is to reduce the amount of federal income taxes payable during the initial five year period and to increase the taxes payable during the remaining life of the properties thus amortized.

**FPC Staff Likes Actual Tax Paid . . .** Staff of FPC is recommending that

the return for present regulation should include only the actual tax paid, and not the amount which would have been paid if the utility declined use of the rapid amortization program. Some experts believe this course would, in large degree, nullify the benefits which Congress intended under the rapid amortization program. Electric and gas utilities, subject to FPC jurisdiction, have received rapid amortization certificates on emergency facilities costing approximately $1 billion.

Panhandle urged the commission to regulate rates on the basis of normal depreciation and normal federal income taxes—thus passing on the benefits of the rapid amortization program to a restricted reserve account. This account would be used for the equalization of federal income taxes as between the first five years and subsequent years, thus preventing recurring rate cases, said Panhandle.

## CALENDAR

***Edison Electric Institute**
Wiring Specifications Committee, EEI Headquarters, New York, Sept. 22-23; Industrial Power-Heating Section, Hotel Roosevelt, New York, Oct. 1-2; Prime Movers Committee, Roosevelt Hotel, New Orleans, La., Oct. 6-7; AEIC joint meeting, Meter-Service Committees, Mayflower Hotel, Washington, D. C., Oct. 6-8; Electrical Equipment Committee, Hotel Roosevelt, New York, Oct. 13-14; Transmission-Distribution Committee, Hotel Adolphus, Dallas, Tex., Oct. 23-24.

**Southeastern Electric Exchange**
Fall Meeting, Engineering-Operation Section, Biltmore Hotel, Atlanta, Ga., Sept. 25-26; Accounting Conference, Jung Hotel, New Orleans, La., Oct. 16-17; Sales Conference, Thomas Jefferson Hotel, Birmingham, Ala., Oct. 29-31.

**Missouri Valley Electric Association**
Accounting Conference, Hotel President, Kansas City, Mo., Sept. 29-30; Sales-Rural Conference, Hotel President, Kansas City, Mo., Oct. 8-10.

***Pennsylvania Electric Association**
Fall Meeting, Electrical Equipment Committee, Irem Temple Country Club, Dallas, Pa., Oct. 2-3; Transmission-Distribution Committee, Penn-Alto Hotel, Altoona, Pa., Oct. 9-10; Fall Meeting, Systems Operation Committee, Hotel Roosevelt, Pittsburgh, Oct. 16-17; Industrial Committee, Bedford Springs Hotel, Bedford, Pa., Oct. 23; Fall Meeting, Meter Committee, Fort Stanwix Hotel, Johnstown, Pa., Oct. 23-24; Prime Movers Committee, Hotel Roosevelt, Pittsburgh, Oct. 30-31; Communications Committee, Hotel Syracuse, Syracuse, N. Y., Nov. 6-7; Fall Meeting, Relay Committee, Robert Treat Hotel, Newark, N. J., Nov. 13-14.

**American Institute of Electrical Engineers**
Fall General Meeting, Jung Hotel, New Orleans, Oct. 13-17; Middle Eastern District Meeting, Commodore Perry Hotel, Toledo, Oct. 28-30; Conference on Machine Tools, Ten Eyck Hotel, Albany, Oct. 29-31; Special Technical Conference on Electrically Operated Recording and Controlling Instruments, Benjamin Franklin Hotel, Philadelphia, Nov. 17-18.

**National Farm Electrification Conference**
Statler Hotel, Detroit, Mich., Oct. 20-21.

*Addition this week.

# Today in Utility Finance

## YIELDS (%)

| Quality | Bonds 1st | Bonds 2nd | Bonds 3rd | Preferred Stocks 1st | Preferred Stocks 2nd | Preferred Stocks 3rd | Common Stocks 1st | Common Stocks 2nd | Common Stocks 3rd |
|---|---|---|---|---|---|---|---|---|---|
| DATE | | | | | | | | | |
| 1952 | | | | | | | | | |
| **Sept. 11** | **2.97** | **3.00** | **3.16** | **4.10** | **4.27** | **4.62** | **5.19** | **5.39** | **6.06** |
| Sept. 4 | 2.96 | 3.00 | 3.16 | 4.09 | 4.26 | 4.61 | 5.20 | 5.52 | 5.99 |
| 2nd 1952 | 2.95 | 3.00 | 3.09 | 4.05 | 4.31 | 4.60 | 5.38 | 5.85 | 6.42 |
| 1st 1952 | 2.95 | 2.99 | 3.13 | 4.11 | 4.29 | 4.66 | 5.35 | 6.03 | 6.47 |
| 4th 1951 | 3.02 | 3.07 | 3.21 | 4.32 | 4.50 | 4.91 | 5.42 | 6.18 | 6.84 |
| 3rd 1951 | 2.87 | 2.91 | 3.04 | 4.05 | 4.27 | 4.61 | 5.52 | 6.24 | 7.05 |

Data: Reis & Chandler, Inc.

## EARNINGS

| Company | Period Month Ended | | Net Income 1952 | Net Income 1951 | Earnings Per Common Share 1952 | Earnings Per Common Share 1951 |
|---|---|---|---|---|---|---|
| Central Illinois Public Service | 12 | June | $5,157,550 | $5,099,657 | $.... | $.... |
| El Paso Electric | 12 | July | 1,402,844 | 1,407,563 | 1.84 | 1.75 |
| Gulf States Utilities | 12 | July | 6,656,862 | 5,839,934 | 1.71(a) | 1.60(a) |
| Potomac Electric Power | 12 | July | 6,147,000 | 4,665,000 | 1.34 | .94 |
| Power Corp of Canada | 12 | June | 1,857,027 | 1,649,495 | 2.81 | 2.35 |

Notes—(a) Based on 3,124,108 shares in 1952 and 2,884,590 shares in 1951.

## FINANCING

| Company and Description | Amount of Offering (000) | Offering Price | Yield to Public |
|---|---|---|---|
| WEEK OF SEPTEMBER 11-17 | | | |
| **Preferred Stock** | | | |
| Duquesne Light—140,000 sh 4.15% $50 par | $7,000 | $51.23 | 4.05% |
| Columbus & Southern Ohio Electric—90,000 sh cum 4.65% $100 par | 9,000 | 100.00 | 4.65% |
| **Common Stock** | | | |
| Columbus & Southern Ohio Electric—300,000 sh | $7,463 | $24.875 | 5.63% |
| WEEK OF SEPTEMBER 18-24 | | | |
| **Bonds** | | | |
| Duquesne Light—1st mtg 1982 | $14,000 | ..... | ..... |
| Pacific Power & Light—1st mtg 1982 | 7,500 | ..... | ..... |
| Central Illinois Public Service—1st mtg 1982 | 5,000 | ..... | ..... |
| Appalachian Electric Power—1st mtg 1982 | 17,000 | ..... | ..... |
| **Notes** | | | |
| Appalachian Electric Power—serial 1956-1967 | $6,000 | ..... | ..... |
| **Preferred Stock** | | | |
| Central Illinois Public Service—50,000 sh cum $100 par | $5,000 | ..... | ..... |
| **Common Stock** | | | |
| Long Island Lighting—599,942 sh (to be offered commonholders on 1-for-7 basis, record Sept. 24 to expire Oct. 9; Blyth & Co—First Boston Corp, underwriters) | $..... | ..... | ..... |
| SCHEDULE FOR SEPTEMBER TO DECEMBER | | | |
| **Bonds** | | | **Bid Date** |
| Washington Water Power—1st mtg 1982 | $30,000 | ..... | Sept. 30 |
| California Oregon Power—1st mtg 1982 | 7,000 | ..... | Oct. 14 |
| Utah Power & Light—1st mtg 1982 | 10,000 | ..... | Oct. 14 |
| Carolina Power & Light—1st mtg 1982 | 20,000 | ..... | Oct. 20 |
| Virginia Electric & Power—1st mtg 1982 | 20,000 | ..... | Oct. 21 |
| Long Island Lighting—1st mtg 1982 | 20,000 | ..... | Nov. 18 |
| New Orleans Public Service—1st mtg 1982 | 6,000 | ..... | Dec. 15 |
| Sierra Pacific Power—1st mtg 1982 | 1,500 | ..... | * |
| **Common Stock** | | | |
| Utah Power & Light—167,500 sh (being offered stockholders on 1-for-10 basis, record Sept. 5 to expire Sept. 25; stockholders allowed over-subscription privileges) | $4,816 | $28.75 | 6.26% |
| California Electric Power—350,000 sh | ..... | ..... | Oct. 7 |
| California Oregon Power—250,000 sh | ..... | ..... | Oct. 14 |
| Idaho Power—225,000 sh | ..... | ..... | ..... |
| Iowa Public Service—150,122 sh (to be offered commonholders on 1-for-8 basis, record Sept. 25 to expire Oct. 14; stockholders to be allowed over-subscriptions; no underwriting) | ..... | ..... | ..... |
| Sierra Pacific Power—26,775 sh (to be offered preferred holders on 1-for-6 basis and commonholders on 1-for-12 basis, record about Oct. 6 to expire Oct. 20) | ..... | ..... | ..... |
| UNSCHEDULED AND UNDER CONSIDERATION | | | |
| **Bonds** | | | |
| Central Maine Power—1st general mtg | $6,000 | ..... | ..... |
| **Common Stock** | | | |
| Central Maine Power | $5,000** | ..... | ..... |
| Cleveland Electric Illuminating | 28,000† | ..... | ..... |

Notes—* To be sold privately. ** Estimated. † Estimated. Directors are meeting this week on possible plan to offer commonholders rights to purchase common stock on about 1-for-5 share basis.

## Hydro Record Set

### Non-federal capacity installed has been doubling every year since 1948

Non-federal electric utilities are showing an ever-increasing ability to develop the nation's hydroelectric resources. This is indicated in a report issued yesterday by Federal Power Commission.

During the fiscal year that ended June 30, FPC issued licenses for hydroelectric projects covering record amounts of installed capacity and investment. The amount of capacity installed has been doubling every year since 1948.

Licenses tabulated were issued to electric companies or non-federal public bodies. The commission has no direct jurisdiction over licensing or authorizing federal hydroelectric projects.

In fiscal 1952 a record 125 applications for licenses were filed and 149 cases were completed—another new high. This compares with an annual average of 107 applications filed and 103 completed during the previous six years.

Total installed generating capacity of projects licensed in one year passed the 1 million-kw mark for the first time. Previous record was 777,400 kw for the 12-month period which ended June 30, 1951. Total investment for projects licensed during fiscal 1951 was $184,544,000—about half the amount for fiscal 1952.

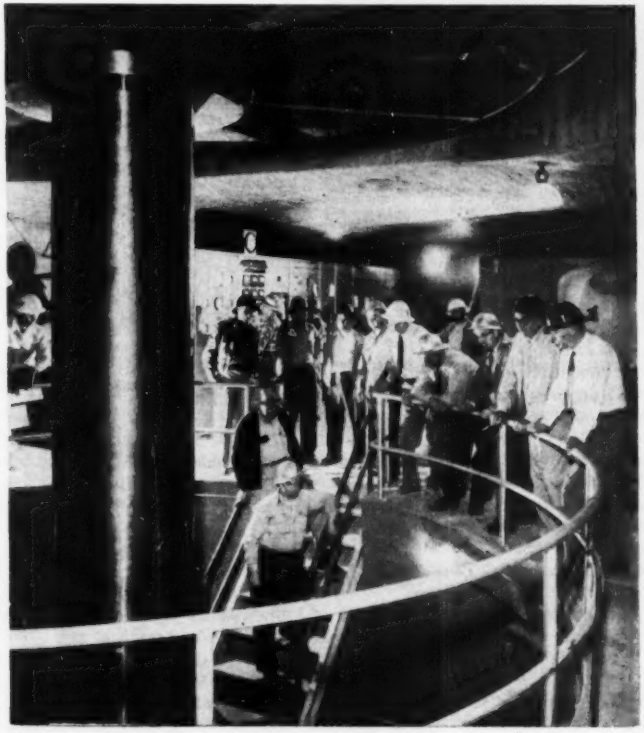
FPC licensing figures reflect only the hydroelectric portion of the huge electric generating expansion program being carried out by the electric companies and public agencies. The largest portion of this expansion is in steam generation, for which no FPC license is required.

**Here is the way non-federal hydro facilities have been developed over the last ten fiscal years:**

| Year | (Kw) | Cost |
|---|---|---|
| 1942 | 12,400 | $2,426,000 |
| 1943 | 203,600 | 45,010,000 |
| 1944 | 149,300 | 23,972,000 |
| 1945 | 166,600 | 34,455,000 |
| 1946 | 2,000 | 789,000 |
| 1947 | 194,600 | 49,587,000 |
| 1948 | 402,900 | 80,730,000 |
| 1949 | 132,900 | 19,109,000 |
| 1950 | 341,400 | 70,257,000 |
| 1951 | 777,400 | 184,544,000 |
| 1952 | 1,410,900 | 363,672,000 |
| **Totals** | **3,794,000** | **874,551,000** |

Of the total investment proposed for projects licensed during the most recent fiscal year, $304,325,000 was involved in new construction. The remainder—$59,347,000—is to go to make capacity additions at projects already constructed.

As of June 30 there were 673 FPC licenses in effect, involving a total installed capacity of 5,750,000 kw and a total claimed cost of $1,419,000,000.



## First Spin of a Hungry Horse Unit

Running tests have begun on the first of four 71,250-kw generators at Bureau of Reclamation's Hungry Horse Dam in Montana. Shaft at left connects the generator, on the floor above, with one of four 105,000-hp turbines that will harness the South Fork of the Flathead River.

## Court Action Taken to Get PUD to Move Its Poles

Unable to get the Clark County PUD to move its utility poles and lines from the path of the new Vancouver Freeway and Evergreen highway near Vancouver, Wash., the Washington State Highway Department has resorted to court action in a case that may set a precedent for other such work in the state.

The PUD franchise with the City of Vancouver states that the PUD is required to move poles at its expense on ten days' notice from the city. The highway department contends this should apply to a state project also but the PUD admits an obligation only toward the city.

The state first tried to get the city to move the poles, but met with quick refusal.

The present case involves work costing only several thousand dollars but could set a pattern for other proposed work elsewhere in the state.

## Sell . . . and Sell . . . and Sell

*Sell . . . and Sell . . . and Sell* is the slogan for an industry program to intensify selling activities by all of the electrical industry to bring more of the advantages of electricity to the home, farm, store and factory. This is the first article of a series reflecting viewpoints of manufacturers, utilities, distributors, contractors, retailers and service organizations.

**J. H. JEWELL**
Vice-President in Charge of Sales
Westinghouse Electric Corp

# Let's Get Our Industry Ready

### Coming let-down in defense spending will require dynamic selling effort to move potential volume of electrical goods and services

The electrical industry must prepare itself now to meet a major change that lies ahead. This change is the one that will occur—perhaps precipitously—when we are forced to shift from comparatively easy disposal of our products and kilowatthours to one of aggressively selling the outputs of our enormously enlarged productive capacity.

When this change will come cannot be predicted definitely; but it will certainly not be longer than a year or two, barring a major international upheaval. In any case the industry must be ready for it. That will take a bit of doing. It will involve major changes all up and down the line in the electrical industry; so major that we must begin their planning without delay.

Since World War II all industry generally has been concentrating on building an enormous national machine to produce consumer and industrial goods. No doubt eventually this great economy of ours will grow to absorb on a normal basis the new production capacity of American industry. But in the meantime we must realize that our ability to produce may have outrun, for a time, our ability to consume.

## OUR PRODUCTIVE CAPACITY IS ENORMOUS

Under forced draft this country produced $213 billion in goods and services in 1944. As a result of private investments, manufacturers have almost doubled the book value of the capacity existing at the end of 1945. This expansion and modernization brought the gross national product in 1951 to $325 billion—a 50% increase over 1944. By the middle of '53 it is expected that we shall be industrially equipped to produce at the annual rate of $350 billion.

**This expansion presents a challenge. Probably, its full effect will be really felt in just about a year from now when our ability to produce will have reached this new**

**high and defense spending is scheduled to be cut back. The peak of private investment in expanded plant facilities will then have passed.** Certainly a sharp reduction in industry expenditures for capital goods is to be expected when that time comes. This reduction of private and government spending must be replaced by commercial and personal consumption. It has been estimated that we must find markets for one-fifth more food, clothing, automobiles, housing, household appliances, air conditioning, lighting, and other durable and consumption items than were brought in 1951.

## THE THREAT IS REAL

If we don't find markets for this indicated larger production of consumer goods, there will be a lot of factory space standing idle. And idle factories mean idle men. That's depression!

It is too much to expect the electrical industry to prevent a general depression. However, if it is organized to do so, it can prevent a serious depression in its own business. It can do so by attacking the coming situation with the same vigor and enterprise that in days past applied electricity to manufacturing operations, thus increasing production and simultaneously shortening working hours; that reduced labor on the farm and in the home, transforming our way of life; that brightened up our stores and offices, facilitating retail trade and commerce.

**Beginning now, if each segment of the industry—the manufacturer, the distributor, the dealer, the contractor, and the public utility—tackles its part of the job, the issue can be met. It is a job for all members of the industry.**

I shall not attempt to say what utilities, distributors, contractors, and dealers can do. I shall confine my remarks to some of those things it seems pertinent for the manufacturer to do to help the electrical industry.

## LET'S LOOK TO OUR PRODUCTS

Good engineering must come first. An honest examination may show that many of them could be significantly improved if we work at it diligently. Many new ones could be added to our lines.

Take our electric system products. Great strides have been made in the design and improvement of power generating equipment and distribution apparatus. Machines now being built are very large and very efficient, but more is to come. On the drawing boards today for delivery in the next three or four years are still larger and more efficient machines, while in development laboratories and in men's minds are ideas for substantial further progress. Thus, by applying engineering talent to future developments rather than confining it just to the production of orders on our books we can expect to make greater progress faster.

A challenge to be met in the industrial field is to be found in the older mills and plants. If these are to compete with new, modern ones their electrical systems—starting with the distribution and continuing through to the utilization and control of power—must be modernized. Otherwise, the modern mills and plants that now stand ready to supply a greater portion of the demand will have a tremendous cost advantage.

But we are by no means through. While automatic controls have done fantastic things, much remains towards harnessing together several or many automatic machines to make the automatic factory. The industry has done little as yet toward solving the problems of automatic and continuous heat treatment. High-frequency heating for hardening, brazing, soldering, curing has made only a start.

Adequacy of materials supply is already a matter of national concern. The electrical manufacturer has a golden opportunity to help solve such problems as the utilization of lower grade iron ores, and to make less costly the production of titanium, tantalum, zirconium, and other metals that may help take the pressure off some of the more common metals that are in limited supply.

**Like the shoemaker whose own children are unshod, the electrical manufacturer needs to modernize his own plant by the addition of some of the drives, controls, heat-treating processes, and better materials-handling facilities he supplies others. The result will be improved and lower cost products with a correspondingly enlarged market.**

Despite war-torn conditions, European electrical manufacturers, faced by shortages of some materials we have in abundance, have done remarkable things with product design. We can profit by some of their lessons and can lower the cost of some of our American electrical equipment.

Much of the equipment we have applied to farm work was designed for industrial use. Only one fourth of the farmers' working time is now spent working in his fields. The farm-equipment manufacturers have mechanized field work. The farmer spends 75% of his working time in activities that still include methods abandoned long ago by industry. The electrical manufacturer has not yet put forth enough effort to create equipment especially suited to this enormous market. Our agricultural industry has need of far more motors. Indeed the farm-motor horsepower will become very impressive if proper equipment is provided and if we educate these customers in the use of electrical facilities as has been done in industry.

The well-established lines of appliances such as refrigerators, irons, and washing machines have been well developed, well promoted, and are well accepted. We need now to turn with equal vigor to further development and promotion of the many new products, such as dishwashers, air conditioners, dehumidifiers, which are now available, as well as to development of others not yet out of the laboratory. We must spend much more time, effort and money in this work. This must begin immediately if we are to expand our markets and load the electrical industry's production facilities.

**And more than this must be done if we are to obtain a larger share of the national income for the electrical industry. It is essential that not only are our appliances properly engineered, but that the methods of manufacturing them are also engineered so that they can be made at the lowest possible cost and least need for servicing.**

Much has been done in this direction. An electric range sells for about the same price as ranges did 30 years ago. This means we are able to give a far more attractive and useful product today for the same number of greatly deflated dollars. But this must not satisfy us. By greater tooling, newer metals, newer conceptions, we can bring even better products to market at lower costs and better profits to ourselves.

The manufacturer must learn how to engineer his major products so that they cost less to install. Among some of

# These Are The MUSTS

the appliances there is too much difference between the price tag at the store and the final cost when the user is first able to press the starting button.

Let's look at the electrical equipment in the modern home and the service problem it presents. If we are to obtain a larger share of the national income all homes must be electrically equipped. The average annual consumption must go and will go eventually to 5000-kwhr which is 2½ times greater than today. This figure of 5,000 is not fantastic. But before it can be realized the electrical industry must do something about the bottleneck of house wiring systems. That's one aspect of service. Another is maintenance in operation of all the equipment the 5,000-kwhr home will require.

This future 5,000-kwhr average home will mean many millions more of appliances and devices, those available today and coming tomorrow. In today's all-electric home most of the equipment is new. Picture this equipment after ten years of use. Some of it will have been replaced by improved models. It will present a real service problem that can be minimized only by production of simplified, durable equipment. This is a real problem for the electrical manufacturer.

In manufacturing, cost reduction must be the watchword of the electrical industry. Cost reduction in the full sense stands between a wide market and a limited market.

## IMPROVE THE 'FIRST TEAM'

Increasing production facilities is one thing. The product-engineering task is another. There is another aspect of the getting-ready job. This is to be sure that management itself is prepared.

**The continued progress of the electrical industry depends upon the establishment of sound plans and policies by its executive officers and upon the ability of its managers to carry out those plans and policies.**

This being true, no task that we face today is more important to the progress of the industry than the building of men at all levels of company operations who can effectively manage other men. The attainment of this objective requires fulfillment of two needs—to make present "first teams" of management men stronger and to develop qualified reserves able to accept increased responsibilities whenever the need arises.

Industry's experience indicates that the accomplishment of desired results in this direction cannot be left to chance. Managements, in rapidly increasing numbers, are seeking help in how consciously, methodically, and continuously to give attention to the qualifications and preparation of management people. They are focusing attention on this need through practical programs of management development designed to fit specific requirements.

**1. We must make our present products and services more desirable. Customers must have the kind of treatment we used to give them when we wanted orders badly. This will mean sound product planning, an honest examination of our lines of product, an appraisal of the market and the position we wish to reach.**

**2. We must add new lines or new uses for present lines. This will require studies of our customers' needs and desires whether they be for home or industry. New products can be added in our industry without end. We must be careful to add those we are set up to manufacture and sell, giving full consideration to cost of revamping manufacture and distribution if necessary.**

## WE MUST IMPROVE DISTRIBUTION

Let's take a look at the problem of distribution. This is where we are most likely to stumble. Electrical manufacturers have spent over $2 billion to increase production facilities since 1945. Many thousands of dollars will be spent to improve and lower the cost of products.

**If we wait until the backlogs of sales begin to dwindle to build up our sales and promotional facilities, we will be in a jam.**

From one to three years are required to build a new production facility. A similar or even longer period is needed to produce and test a new product. To build an effective sales organization and promotional program to market the output requires an equally long time.

Some manufacturers are already moving in on this problem. A few have already started programs of training sales people just as they are training production people for the new plants. Some manufacturers, realizing that market acceptance of new products is not accomplished over night, are building promotional and advertising programs to market the output of the new facilities.

These necessary things done, we must brace ourselves for another problem. As backlogs dwindle and we begin to feel the pressure of lower volumes there will be the natural tendency to reduce expenses, including sales and promotional expenses. Unless we plan wisely, our facilities may be ready and our backlog may be reduced before we have a matching sales organization. In the general drive to reduce expenses we may have even greater difficulty in obtaining a sales organization or even going ahead with plans to produce one.

## TO SELL WE MUST PROMOTE

After observing what happened to the appliance business this spring with our industry's present manufacturing capacity and record high savings in the hands of the public, no one should need convincing that immeasurably stronger advertising, promotion, and selling will be needed in the period ahead.

**3. We must have more people of management caliber and training as the industry grows, as our plants grow, and as the personnel of our plants increase. We must provide actively for skilled management as much as we must engineer, produce, promote, and sell our products.**

**4. We must expand volume. Manufacturer's sales costs, distribution and dealer costs, and service costs are all a part of the total cost of selling. Market research, sales training, selective selling are tools for attaining larger volume at lowest distribution costs.**

**5. We must provide better availability of product because it can help increase our volume in areas already covered as well as in virgin territory. In the electrical busines prompt shipment of ordered equipment can bring about increased sales as well as can adequate stocks of appliances and light bulbs.**

**6. We must step up effectiveness of selling and advertising. If our manpower is found to be wanting we must immediately try to attract strong, well-educated sales people and then train them in the business of selling electrical products.**

**Electrical manufacturers must examine themselves honestly so that the industry as a whole can continue to move ahead. It must do so before it is caught in a move to retrenchment because of reduced production. The electrical industry does not need to have a serious curtailment if we will immediately create and execute a market-preparedness program.**

The fact that practically every woman in the United States would like to own an electric kitchen and a modern laundry is no reason to believe that the family dollars will be allocated to make a down payment on them unless we persuade Mr. & Mrs. America that such a prize is not only desirable but within their reach. How many families have the slightest idea how much it would cost per month to own a modern electric kitchen? They could find out by going to their appliance dealer or home loan bank, but why should they? How many appliance manufacturers are making them want to find out with that beautiful kitchen advertising we used to see?

Let's be realistic. If our industry is to sell electric appliances at anywhere near the volume indicated by the latent desire to own them, we will have to make the family purchasing agent want an electric kitchen more than she wants the newest automobile, a new set of furniture, or a South American cruise. We are a growth industry but so are other industries who compete for the dollars of our potential customers. We've got to do more and more appealing advertising on some of the newer appliances.

We speak of the 5000-kwhr home. It will not just happen. The magnitude of growth indicated by it must be reached within limits of user investment and operating expense commensurate with the average income. It is estimated that the average residential investment in electricity-using equipment is 50 cents per kwhr of annual use, at today's prices. This means that the future 5000-kwhr average home will have an investment of $2500 in electrical equipment, as against $1000 in today's 2000-kwhr average home. To attain this increase of $1500 in 10 years will require the average user to invest $150 per year in new equipment.

At the end of ten years we anticipate there will be 54 million wired homes. The combined value of electrical equipment in these homes (50¢ per kwhr for 5000 kwhr by 54 million customers) will be $135 billion. The present combined valuation is $40 billion (50¢ per kwhr for 2000 kwhr by 40 million customers). This means we shall have to put electrical goods into the homes of America to the tune of $95 billion in ten years, $9.5 billion average per year. And bear in mind, this is additional equipment; the replacement market is not included.

**Expenditures for consumer durable goods—furniture, automobiles, electrical appliances etc.—are now at the rate of about $27 billion per year. Thus, to reach 5,000-kwhr average annual use in 10 years we shall have to persuade the average residential customer to invest in electrical equipment at least one third of what he now spends for durable goods.**

We'll have to persuade the user also to pay a higher bill for electricity. Instead of the present average of $56 per year, his bill will probably be around $120.

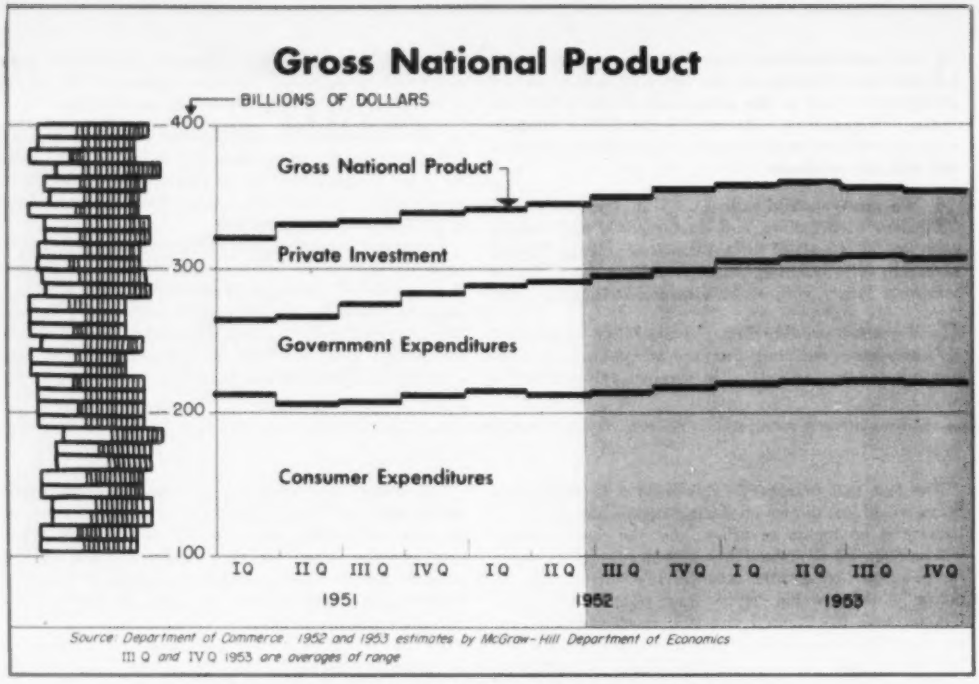
For our industry to capture that share of the consumer's expenditures in competition with other aggressive industries will require the best efforts of all associated with the electrical industry.

## HIT THE COMMERCIAL MARKET TOO

In the commercial field, too, today's tremendously higher standards of lighting, today's skyrocketing demand for air conditioning, and today's need and growing desire for modern high-speed elevators and electric stairways give the electrical industry literally hundreds of thousands of prospects who are much larger potential users of electrical products and kilowatthours than they have been up to now.

Many new and very modern office buildings are being erected. These offer opportunity for the promotion of developments in power-distribution equipment as well as the services just mentioned. Also, the erection of new buildings is making it more necessary for older buildings to modernize if they are to be tenanted. But it's going to take a great deal of educating and persuading to make merchants and building owners undertake the financial investment required—even though 90% of them probably agree today that such high standards of building electrification are not only desirable but inevitable.

In view of our great advance in the last few years under stress of providing for enormous emergency requirements we may fail to see the urgency of our present situation. It is true that we have been supplying a demand that has required little if any promotion. This is just as true in the supplying of steam turbines and motors as it is to selling electrical equipment to the office building, home, and farm.




**Gross National Product and Components—Billions of Dollars**

| | 1951 | | | | 1952 | | | | 1953 | | IIIQ | | IVQ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IQ | IIQ | IIIQ | IVQ | IQ | IIQ | IIIQ | IVQ | IQ | IIQ | Range | | Range | |
| Gross National Product | $319.6 | $329.3 | $330.9 | $337.1 | $339.4 | $343.2 | $346.3 | $352.8 | $357.1 | $358.6 | $351.5 | $358.5 | $347.2 | $356.7 |
| Government Expenditures | 51.9 | 59.8 | 67.3 | 71.2 | 74.4 | 78.0 | 79.3 | 81.5 | 84.1 | 85.6 | 84.5 | 86.0 | 84.0 | 86.2 |
| Private Investment | 57.1 | 65.0 | 57.3 | 55.5 | 51.9 | 50.2 | 51.5 | 53.3 | 53.0 | 52.0 | 48.5 | 50.5 | 45.0 | 48.5 |
| Consumption Expenditures | 210.5 | 204.5 | 206.4 | 210.5 | 213.2 | 214.9 | 215.0 | 218.0 | 220.0 | 221.0 | 219.5 | 221.0 | 216.5 | 221.0 |

# Business Will Continue at High Level

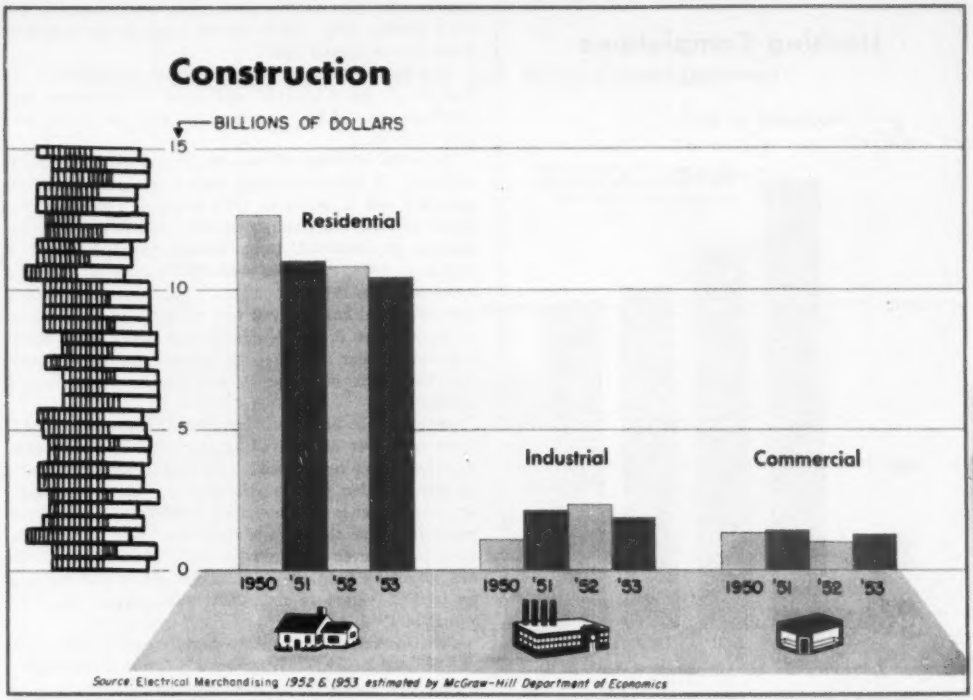
**Steel strike pushed boom peak into 1953, and decline then will be gradual. Defense expenditures will be rising and capital expenditures near the top**

There's another year of high-level business activity ahead. The current upswing—as production recovers from the effects of the steel strike—will last well into 1953. And even if business slides later in the year, gross national product, consumer spending, and industrial production will each compare favorably with 1952 for the year as a whole.

A while back, this would have been a surprising forecast. Most people expected the peak of the business boom to come in 1952. But the eight-week steel strike changed that. As fabricating plants ran out of steel, peak deliveries of munitions and capital goods were pushed backward. And inventories all through the durable goods industries were drawn down.

It now looks as though the early months of 1953 will see defense expenditures still on the rise, business capital expenditures still very high, and consumer durables industries still trying to rebuild inventories and hit full production rates. The soft goods industries—which were in the doldrums for most of '52—are now picking up. And construction activity will stay close to present levels. In short, for a few months at least, we may have everything booming at once, and a new high in business activity.

Charts and tables spell out this pattern. Industrial production may average close to 225 in the first half of 1953, compared with less than 220 for the last half of 1952, and only 210 in 1952's second quarter. Gross national product may rise from an annual rate of about $346 billion in the




**Construction—Billions of Dollars**

| | Residential | Industrial | Commercial |
|---|---|---|---|
| 1950 | 12.6 | 1.1 | 1.3 |
| 1951 | 11.0 | 2.1 | 1.4 |
| 1952 | 10.8 | 2.3 | 1.0 |
| 1953 | 10.4 | 1.8 | 1.2 |

**INDUSTRIAL CONSTRUCTION will pass its defense-stimulated peak this year but total volume will still be heavy during 1953. Construction of commercial buildings, held back by controls, will take up some of the slack as industrial work drops. New home construction during 1953 won't be much below 1951**

third quarter of 1952 to about $358 billion in the first half of 1953. Industrial production shows a bigger rise because the 1952 figures were more depressed by the steel strike.

How long will the higher levels hold? It's hard to say this far ahead. By mid-1953 the extra demand for steel, accumulated during the strike, will probably be filled. Defense expenditures may be levelling out—or dropping if there are no new war scares. And business spending on plant and equipment seems likely to be on the way down. In this situation it's easy to see that business activity could drop.

But there are other factors working against a severe decline in business during the late months of 1953. If defense spending is reduced—and perhaps even if it is not—taxes are very likely to be reduced also. Tax cuts late in '53 might perk up consumer and business spending just when they might otherwise begin to sag or at least keep the sag from going very far.

Perhaps the best policy is to consider a range of business activity for the last half of 1953. At best, activity may hold to the high level set in the first six months. At worst, activity will be lower than in early '53, but still close to the average for the last half of '52.

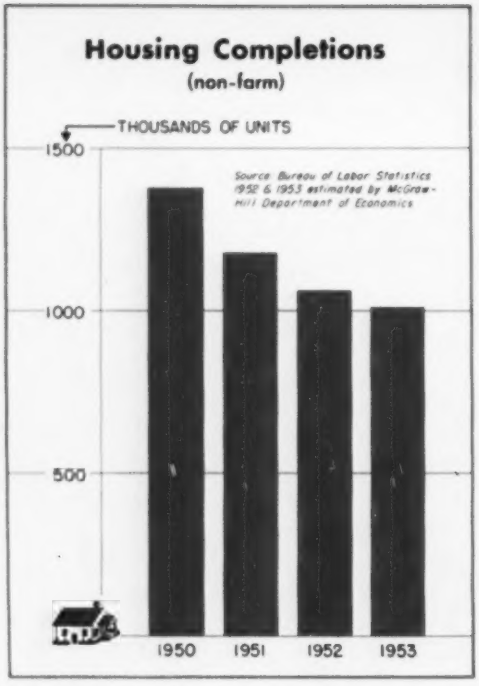
One important point, however. The industrial production index, which is heavily weighted by the steel and metal-working industries, may be substantially lower toward the end of 1953 than in the catch-up months of late 1952.

What about inflation in 1953? Chances are there won't be much. Some items in the cost of living—such as rents and services—are still moving up. But food prices won't rise much next year. And that will prevent much overall rise in living costs. Wages also may show less rise than in '52, as the latest round of increases will be spent by early next year. And a big new round is not likely to

**Industrial Production Index**
(1935–39=100)

| 1952 | | 1953 | |
|---|---|---|---|
| I Quarter | 221 | I Quarter | 225 |
| II Quarter | 210 | II Quarter | 223 |
| III Quarter | 206 | III Quarter | 221 |
| IV Quarter | 220 | IV Quarter | 217 |

Federal Reserve Board Index. Estimates by McGraw-Hill Department of Economics




**Housing Completions (Non-Farm)-Thousands**

| | | | |
|---|---|---|---|
| 1950 | 1,373 | 1952 | 1,060 |
| 1951 | 1,174 | 1953 | 1,010 |

start with the cost-of-living index fairly stable.

Industrial prices won't move up much either. Nor will construction costs. Even though demand is high, there's plenty of capacity to supply the need for most products. So competition will hold down the number of cases where prices are increased.

**New Construction . . .** Total new construction will set a record in 1952—about $32 billion. And it's likely to stay close to that figure in 1953, as well.

The big increases now are in public construction (highways, schools, etc), so they don't show up on EW charts. And they aren't so important to utilities. Work on residential, commercial, and industrial buildings is declining slowly. But it's still expected to stay at very high levels through 1953.

Non-farm housing starts seem sure to pass the million mark again this year for the fourth in a row. Credit controls and tightness in mortgage money will probably hold starts slightly below last year's 1.1 million. But the total amount spent on new home construction won't be much below last year's $11 billion.

Preliminary indications outline another good housing year in 1953. A survey by the Federal Reserve Board shows that consumers plan to buy about as many new homes next year as this year. And credit controls will be a smaller drag. Starts should range in the neighborhood of one million again.

Housing completions will be slightly higher than the number of starts in 1952 and 1953. Completions may number around 1.06-1.1 million in 1952, and 1-1.05 million in 1953.

Industrial building will pass its defense-stimulated peak this year. It will be declining from now on; but total volume will still be heavy in 1953 as major expansion programs in steel, chemicals, aluminum, and other heavy industries are completed. Dollar volume may amount to $1.8 billion in 1953, compared with $2.3 billion of industrial construction in 1952.

Commercial building will take up some of the slack as industrial work drops. Needs for new stores, office buildings, and similar structures are tremendous. Construction was held back this year by controls on materials and credit.

Controls will hold back commercial building in 1953, too—by a sort of delayed action. The threat of continued controls on materials and money has keep many potential builders from buying land and laying out plans. So the resurgence in commercial building will be delayed somewhat while these preparations are being made; some projects will even be pushed on into 1954. But enough new projects should get going to put commercial building up to $1.2 billion or more next year against about $1 billion in 1952.

Construction costs should be fairly stable between now and the end of 1953. Wage costs will rise a little. But the increase should be roughly balanced by an increase in efficiency. And materials prices are expected to stay level—the chief construction metals have already had recent price increases, and cement, lumber, and other nonmetallic building materials are not expected to go up much, if at all. One highly important material—copper—may even cost less by the end of 1953. World supplies are increasing faster than world demand.

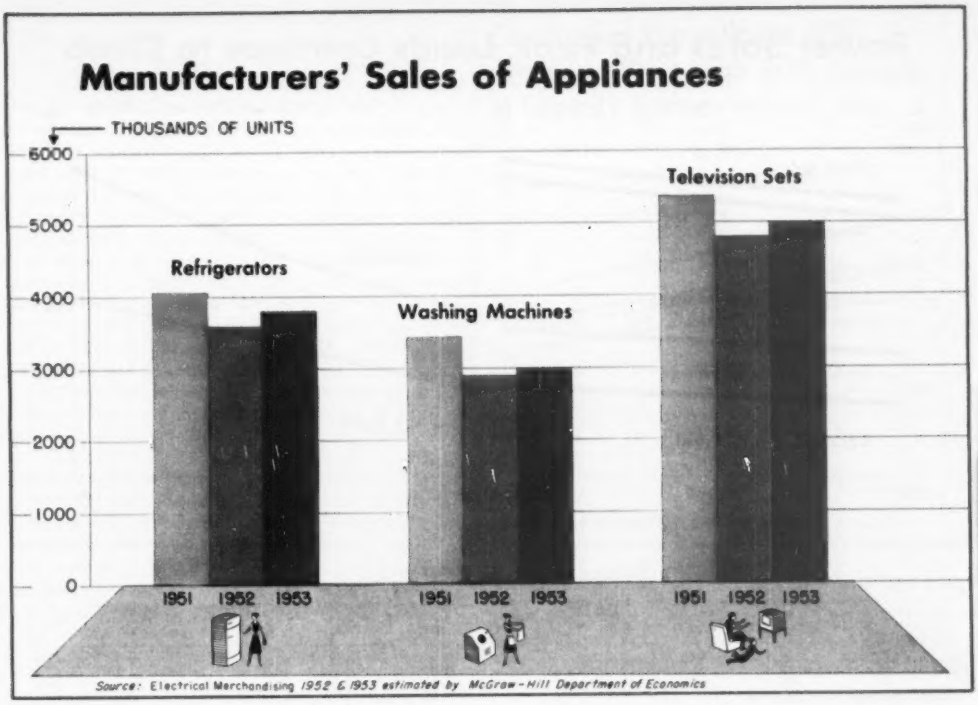
**Consumer Spending—Appliances . . .** Consumer expenditures—including spending on electric appliances—will probably be higher in 1953 than in 1952.

Consumer purchases of all kinds of durable goods are now running about $27 billion per year. That's the annual rate estimated for the last three months of 1952. It compares with a rate of $31 billion early in 1951 and as low as $25 billion early in 1952. In 1953, spending should hold at the $27 billion rate, or better, well into the new year.

What this level of consumer spending would mean in terms of demand for various kinds of appliances is shown in the table below. This table lists manufacturers' sales because retail figures, by type of appliance, are not available. Consumer spending in 1952 has been somewhat steadier than the above table indicates. In the first half of 1952, consumer spending on all durable goods dropped about 10%, retail sales of appliances went down 20%, while manufacturers' sales dropped from 30% to 40% on most types of appliances.

Here is what really went on:

**1.** Consumers shifted their buying away from durable goods to non-durable goods and services. And they really cut down on appliances, more so than on other durables such as furniture, automobiles or jewelry.




**APPLIANCE SALES will probably be higher in 1953 than in 1952. This may be expected because increased national production along with wage increases now being granted will mean higher payrolls and more money for people to spend. New model appliances and price firming will help. Rising sales until mid-1953, and fairly stable sales during the rest of the year may be expected**

**2.** When consumers cut their appliance purchases, inventories piled up at retail. When retailers began offering discounts, consumers held off further—to wait for lower prices.

**3.** Manufacturers' sales then declined sharply because retailers were selling out of stock without reordering.

Starting in May, for most lines, retail appliance sales turned stronger. And excess inventories are pretty well gone now. Manufacturers' sales are up a bit too and about in line with consumer buying.

In fact, manufacturers' sales in the second half of 1952 might be somewhat higher than estimated in the table if production had not been set back by the steel shortage resulting from the strike. In other words, consumer demand for appliances is temporarily a little ahead of the makers' ability to produce.

This does not mean there will be shortages. Production, plus existing inventories, will meet all likely consumer demands for the rest of this year (unless there's another war scare). As we get into 1953, steel will be less of a problem; and production can easily support a rise in appliance sales.

Rising expenditures on appliances and other consumer goods are to be expected because the upswing in national production—along with wage increases now being granted —will mean higher payrolls and more money for people to spend. New model appliances will help. And some people who were waiting for lower prices will probably buy now that distress sales are over and prices firming up.

Whether high appliance sales will be maintained beyond the middle of 1953 is hard to estimate now. Appliance sales are dependent, to a great extent, on consumers' income and on what they think will happen to prices. Consumers may cut their purchases again if income levels out or if supplies of appliances increase and price weakness shows up later in 1953.

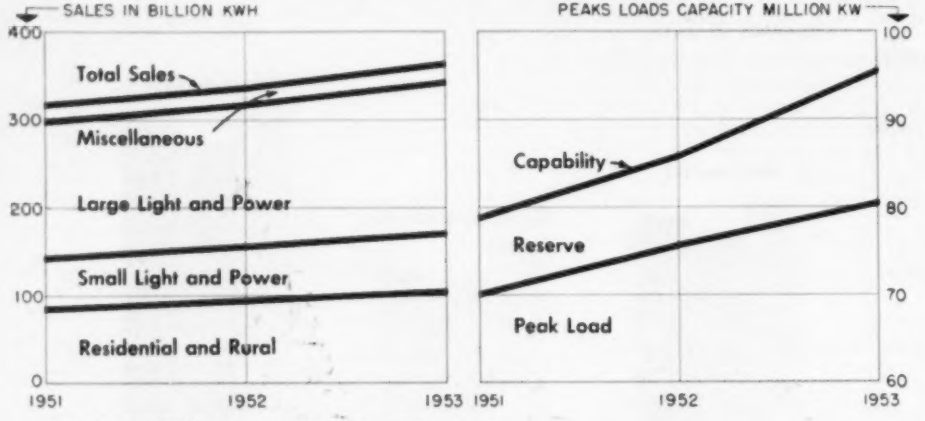
But the most likely pattern appears to be rising appliance sales until mid-1953 and fairly stable sales during the rest of the year. And this would mean more new appliances installed in '53 than in '52.

**Manufacturers' Sales of Appliances-thousands of units**

| | 1951* | 1952** | | 1953** | |
|---|---|---|---|---|---|
| | | First Half | Second Half | First Half | Second Half |
| Refrigerators | 4,075 | 1,700 | 1,700 | 2,000 | 1,800-2,000 |
| Washing Machines | 3,433 | 1,400 | 1,500 | 1,500 | 1,500-1,600 |
| Vacuum Cleaners | 2,700 | 1,400 | 1,400 | 1,500 | 1,300-1,400 |
| Ranges | 1,400 | 475 | 600 | 700 | 600- 800 |
| Freezers | 1,050 | 380 | 450 | 500 | 500- 600 |
| Radios, home | 6,751 | 1,830 | 2,750 | 3,100 | 2,900-3,100 |
| Television | 5,385 | 2,300 | 2,500 | 2,500 | 2,500-2,800 |
| Dishwashers | 260 | 80 | 90 | 110 | 90- 100 |
| Dryers | 495 | 270 | 280 | 280 | 340- 360 |
| Water Heaters | 845 | 220 | 280 | 300 | 280- 300 |

* *Electrical Merchandising*
** Estimated by McGraw-Hill Dept of Economics

## Power Sales and Peak Loads Continue to Climb




Source: Electrical World estimates all systems contributing to public supply

**Electrical World's Forecast for 1952-1953**

| | Residential & Rural Billion Kwh | Small Light & Power Billion Kwh | Large Light & Power Billion Kwh | Misc. Billion Kwh | Total Sales Billion Kwh | Output Billion Kwh | L.F. (%) | Peak Million Kw | Capability Million Kw | Reserve (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1951 | 85.5 | 57.3 | 157.8 | 17.5 | 318.1 | 371.9 | 60.3 | 70.4 | 79.0 | 12.2 |
| 1952 | 96.1 | 61.3 | 163.6 | 17.9 | 338.9 | 395.0 | 59.4 | 76.0 | 86.2 | 13.4 |
| 1953 | 106.0 | 65.3 | 175.6 | 18.3 | 365.2 | 425.0 | 60.0 | 80.8 | 96.1 | 18.9 |

Source: Electrical World Estimates

# Utility Budgets Expand . . . Peak Loads Under Estimates

### Cutback in defense program, shortages of materials, and steel strike reduce load growth and capacity additions

The 9.0 million kilowatts of generating capacity scheduled for 1952 has now been scaled back to 7.2 million kilowatts and the 12.0 million kilowatts planned for 1953 will be cut back to 9.9 million kilowatts. These figures covering all utility systems contributing to the public supply are our revised estimates for increased system capability based on median hydro conditions. They reflect all of the delays from material shortages as presently envisioned.

The corresponding peak loads on utility systems have also been revised downward. Instead of the industry estimate of 10 million kilowatts increase in the 1952 peak over 1951, we now predict 5.6 million kw to a total of 76 million kw. For 1953 we predict a growth of approximately 5 million kilowatts to 81 million kilowatts.

**Reserve Capacity Ample . . .** With increased capacity of almost twice the load growth, reserve margins in 1953 will approximate 19% at the time of winter peak. This corresponds to the desired margin of 20%. Such comparisons are at best only rule-of-thumb guides since many systems now have summer peaks and some areas will be short of desirable margins in the winter of 1953. But considering all factors, most areas should be approaching adequate reserves by the end of 1953.

An increase of some 30% in capacity additions in 1953 over 1952 will necessitate substantial budget increases. Electrical World forecasts capital expenditures for all electric power systems of $3.8 billion in 1952 and $4.3 billion in 1953. Not only will increased expenditures be required for the 10 million kilowatts of generating capacity, but also for new transmission ties, industrial facilities and atomic energy plants.

**Growth Rate Declining . . .** Sales of energy to all classes of customers have been decreasing in rate of growth. It is predicted that residential and rural sales will increase 11.6% and 11.0% in 1952 and 1953 respectively compared with 15.0% in 1951.

Small light and power will gain 7% in 1952 and 1953 compared with 14% in 1951.

Large light and power sales vary with industrial produc-

tion. But it has been assumed that there will be an annual growth of 4% per year due to mechanization only. Since it is expected that the average physical production will be the same in 1953 as in 1952, the sales to industrials will be up about 4%.

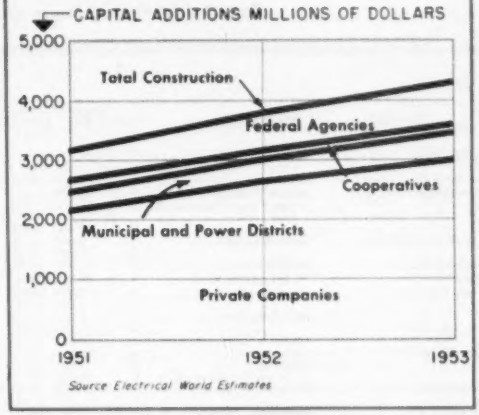
When sales are referred to the generating plant, we arrive at total output for load of 395 billion kilowatthours in 1952 and 425 billion kilowatthours in 1953. Annual load factors are expected to drop slightly in 1952 due to the effects of the steel and other strikes along with periods of bad business in certain industries. Complete load statistics are shown in the attached table.

A leveling off in load growth in 1952 and 1953 has been expected as a reaction to the unusual gains in 1951. But this slowing down conforms with earlier predictions of a return to normal. The capacity expansion program has not only remained intact but has been extended into 1955. The installed capacity goal has been boosted from 32 million kilowatts for the 1952-54 period to 42 million kilowatts for the years 1952-55.

**Capacity Program Still Grows . . .** After deducting 17 million kilowatts for 1952 and 1953 there will remain 25 million kilowatts scheduled for the following two years or an average of 12.5 million kw per year.

This current forecast for 1952 and 1953 varies little from that published in the May 19, 1952 issue of ELECTRICAL WORLD. Whereas the estimated peak loads for 1953 are slightly less than earlier predictions along with capacity additions, the basic long range data requires little revision.

## Construction Expenditures Will Expand in 1953 With 30% Increase in Capacity Added

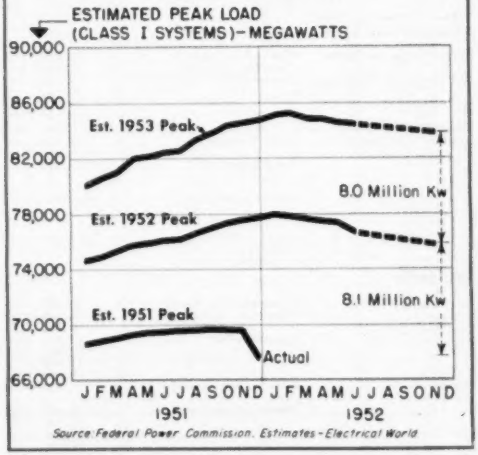



Source Electrical World Estimates

**Construction Expenditures**

| | 1951 | 1952 | 1953 |
|---|---|---|---|
| Private Companies | $2,133,926,000 | $2,651,851,000 | $3,000,000,000 |
| Municipals & Power Dist. | 309,398,000 | 349,952,000 | 450,000,000 |
| Cooperatives | 178,600,000 | 137,600,000 | 120,000,000 |
| Federal Agencies | 529,529,000 | 652,649,000 | 700,000,000 |
| Total | $3,151,453,000 | $3,792,052,000 | $4,270,000,000 |

## How Utilities Are Revising Peak Load Estimates




Source: Federal Power Commission, Estimates - Electrical World

**Electric Utility Estimates of December Peak Loads**
Class I Systems—Thousands of Kilowatts

| | 1951 Jan. | 1951 June | 1951 Dec. | 1952 Jan. | 1952 June |
|---|---|---|---|---|---|
| 1951 | 68,705 | 69,494 | 67,870 (Actual) | ..... | ..... |
| 1952 | 74,705 | 76,181 | 77,794 | 78,029 | 76,843 |
| 1953 | 80,222 | 82,547 | 84,935 | 85,297 | 84,759 |

Source: Federal Power Commission Survey Estimates—Electrical World

## Utility Peak Forecasts Remain High

Class I system peak loads will increase 9.0 million kilowatts in 1952 and 7.9 million kilowatts in 1953 according to the June estimates submitted to the Federal Power Commission by the utilities. In June 1951 the December peak was estimated to be 69,494,000 kilowatts compared to the actual of 67,870,000 kilowatts. The area estimates supplied to the Federal Power Commission have not been adjusted for the effects of the steel strike. In addition to this factor, the utilities are obliged to estimate peaks on the basis of scheduled completion of industrial and commercial facilities. This is the only basis upon which system planners can be assured of adequate system capacity. The current trend of revision downward in the peak estimates is shown by dotted line in graph.

**Tennessee Gets More Capacity . . .** Total system generating capacity schedules by regions as reported by the Federal Power Commission are shown on the following pages. Heavy shifts are taking place in the area distribution of generating facilities. Region III containing Tennessee and neighboring states has almost 15% of the present capacity but it is adding 28% of that scheduled for the next three years. One other area showing gains is Region V central south with 8% of capacity which is adding 10% of scheduled capacity.

These recent statistics from the Federal Power Commission do not include the capacity for the atomic energy program expansion.

# New Electric Generating Facilities

**Compiled by Federal Power Commission as of August 1, 1952**

| System | Plant & Location | Type | Capacity Kw | To Be Completed |
|---|---|---|---|---|
| **REGION I** | | | | |
| Bangor Hydro Elec | Graham; Veazie, Me | GT | 6,000 | 1952 |
| Central Maine Pwr | Mason Wiscasset, Me | S | 30,000 | 1953 |
| | Indian Pond; Kennebec R. blk. | H | 22,500 | 1954 |
| | | H | 22,500 | 1954 |
| Central Vt. Public Serv | Rutland; Rutland, Vt | GT | 5,000 | 1952 |
| | | GT | 5,000 | 1952 |
| Hartford Elec Lgt | Middletown, Conn | S | 60,000 | 1953 |
| West Mass. Elec | W. Springfield, Mass | S | 46,000 | 1952 |
| Conn. Lgt & Pwr | Thompsonville, Conn | GT | 5,000 | 1952 |
| | | GT | 5,000 | 1952 |
| | Danielson, Conn | GT | 5,000 | 1953 |
| | | GT | 5,000 | 1953 |
| | Montville, Conn | S | 75,000 | 1954 |
| New England Pwr | Salem, Mass | S | 75,000 | 1952 |
| | Westerly, R. I. | GT | 5,000 | 1953 |
| | So. Street; Providence, R. I. | S | 50,000 | 1954 |
| Boston Edison Co | Edgar; N. Weymouth, Mass. | S | 81,250 | 1952 |
| | | S | 81,250 | 1954 |
| Green Mt. Pwr | Waterbury; Waterbury R., Vt. | H | 5,900 | 1953 |
| Pub. Serv. of N. H. | Schiller; Portsmouth, N. H. | S | 40,000 | 1952 |
| Taunton, Mass., Munic | West Water St. Sta | S | 7,500 | 1952 |
| United Illuminating | English; New Haven | S | 30,000 | 1953 |
| Niagara Mohawk Power | Albany, N. Y. | S | 80,000 | 1952 |
| | | S | 80,000 | 1952 |
| | | S | 80,000 | 1953 |
| | | S | 80,000 | 1954 |
| | Huntley; Buffalo, N. Y. | S | 80,000 | 1953 |
| | | S | 80,000 | 1953 |
| | Stewart Bridge; Sacandaga R. | H | 30,000 | 1952 |
| | S. Colton; Raquette R. | H | 12,000 | 1954 |
| | Five Falls; Raquette R. | H | 22,500 | 1955 |
| | Rainbow Falls; Raquette R. | H | 22,500 | 1955 |
| | Prospect; W. Canada Creek | H | 15,000 | 1955 |
| | Fells Mills; Black R. | H | 11,000 | 1955 |
| N. Y. State Elec & Gas | Greenidge; Dresden | S | 80,000 | 1953 |
| | Unassigned | S | 100,000 | 1955 |
| Rochester Gas & Elec | Station 26; Genesee R. | H | 4,000 | 1952 |
| | Sta. 7 or Russell | S | 50,000 | 1953 |
| Central Hudson Gas & Elec | Neversink; Grahamville, N. Y. | H | 25,000 | 1952 |
| | Dansk ammer; Marlboro, N. Y. | S | 60,000 | 1954 |
| Long Island Lts | Glenwood 3; Glenwood Ldg | S | 99,000 | 1952 |
| | | S | 99,000 | 1954 |
| | Far Rockaway, Far Rockaway | S | 99,000 | 1953 |
| | Unassigned | S | 160,000 | 1955 |
| | Unassigned | S | 160,000 | 1955 |
| Consolidated Edison | East River; Manhattan | S | 175,000 | 1952 |
| | | S | 160,000 | 1954 |
| | Astoria, Long Island City | S | 160,000 | 1953 |
| | | S | 160,000 | 1953 |
| Atlantic City Elec | Deepwater Plant, N. J. | S | 60,000 | 1954 |
| | Greenwitch, Gibbstown, N. J. | S | 10,000 | 1952 |
| Delaware Pwr and Lgt | Edgemoor; Wilmington | S | 75,000 | 1954 |
| Jersey Cent Pwr & Lgt | South Amboy | S | 62,500 | 1953 |
| | Raritan River; Sayreville | S | 125,000 | 1954 |
| Metropolitan Edison | Titus; Reading, Pa | S | 80,000 | 1953 |
| Pennsylvania Electric | Front St.; Erie, Pa | S | 66,500 | 1952 |
| | Shawville, Clearfield, Pa | S | 125,000 | 1953 |
| | | S | 125,000 | 1954 |
| Penna. Pwr and Lgt | Sunbury; Sunbury, Pa | S | 125,000 | 1953 |
| | Martins Creek, Pa | S | 132,500 | 1954 |
| Philadelphia Electric | Delaware; Philadelphia, Pa. | S | 125,000 | 1952 |
| | | S | 125,000 | 1953 |
| | Cromby, Phoenixville, Pa. | S | 150,000 | 1953 |
| | | S | 200,000 | 1955 |
| Pub Serv Elec & Gas of N. J. | Kearney; Newark, N. J. | S | 145,000 | 1952 |
| | | S | 145,000 | 1953 |
| | Burlington, N. J. | S | 185,000 | 1954 |
| Rockland Lgt & Pwr | Hudson; Tompkins Cove, N. Y. | S | 66,000 | 1954 |
| | East Branch, Grahamsville, N. Y. | H | 18,000 | 1954 |
| Scranton Electric | Stanton; Harding, Pa | S | 40,000 | 1953 |
| Consolidated Gas & Electric Light & Power of Baltimore | Gould Street, Baltimore | S | 80,000 | 1952 |
| | Riverside Sta, Baltimore | S | 60,000 | 1953 |
| | Herbert Wagner; Hawkins Pt. | S | 100,000 | 1955 |
| Potomac Electric Power | Potomac R.; Alexandria, Va. | S | 90,000 | 1954 |
| Pennsylvania Wtr and Pwr (this hydro plant has recently begun adding steam capacity) | Holtwood; Holtwood, Pa. | S | 60,000 | 1954 |
| Bethlehem Steel (Industrial) | Sparrows Point, Baltimore | S | 20,000 | 1953 |
| | **Total Region I** | | **5,454,400** | |

| System | Plant & Location | Type | Capacity Kw | To Be Completed |
|---|---|---|---|---|
| **REGION II** | | | | |
| Duquesne Light | Elrama; Elrama, Pa. | S | 80,000 | 1953 |
| | | S | 100,000 | 1954 |
| | F. R. Phillips; S. Heights | S | 125,000 | 1955 |
| Monongahela Power | Albright, W. Va. | S | 66,000 | 1952 |
| | | S | 66,000 | 1952 |
| West Penn Power | Springdale, Pa | S | 125,000 | 1954 |
| Cleveland, Municipal | Lake Road | S | 25,000 | 1952 |
| | | S | 25,000 | 1952 |
| Cleveland Electric Illuminating | Willoughby; East Lake | S | 100,000 | 1953 |
| | | S | 100,000 | 1953 |
| | | S | 100,000 | 1953 |
| | | S | 150,000 | 1955 |
| Columbus & So. Ohio Elec | Poston, Nelsonville | S | 60,000 | 1953 |
| Ohio Edison | Niles Sta | S | 106,000 | 1953 |
| | | S | 106,000 | 1953 |
| | Burger, Dilles Bottom | S | 135,000 | 1954 |
| | | S | 135,000 | 1954 |
| Pennsylvania Power | New Castle; New Castle | S | 85,000 | 1952 |
| Ohio Power | Muskingum; McConnelsville | S | 175,750 | 1953 |
| | | S | 175,750 | 1953 |
| Appalachian Elec Power | Kanawha, Montgomery, W. Va. | S | 175,750 | 1953 |
| | | S | 175,750 | 1953 |
| Ind. and Mich. Elec | Tanners Creek; Lawrenceburg | S | 125,000 | 1952 |
| | | S | 175,750 | 1954 |
| Danville, Va. Municipal | Brantley, Va | S | 11,500 | 1952 |
| | | S | 11,500 | 1952 |
| U. S. Corps of Engineers | Philpot, Smith River, Va. | H | 6,700 | 1952 |
| | | H | 6,700 | 1952 |
| | | H | 600 | 1952 |
| Consumers Power | Whiting; Monroe, Mich. | S | 85,000 | 1952 |
| | | S | 106,000 | 1953 |
| | Weadock; Bay City, Mich. | S | 135,000 | 1954 |
| Detroit Edison | St. Clair, Detroit | S | 125,000 | 1953 |
| | | S | 125,000 | 1953 |
| | | S | 125,000 | 1954 |
| | | S | 125,000 | 1954 |
| Detroit, Municipal | Mistersky, Detroit | S | 40,000 | 1955 |
| Lansing, Mich, Municipal | Moores Park | S | 40,000 | 1954 |
| Cincinnati Gas & Elec | Beckjord; Cincinnati | S | 100,000 | 1953 |
| | | S | 125,000 | 1954 |
| Dayton Power and Light | Hutchings; Miamisburg | S | 60,000 | 1952 |
| | | S | 60,000 | 1953 |
| Ft. Wayne, Ind Municipal | | GT | 5,000 | 1953 |
| | | GT | 5,000 | 1954 |
| Hamilton, Ohio Municipal | | S | 10,000 | 1953 |
| Indianapolis Power & Light | White River; Centerton | S | 60,000 | 1952 |
| | | S | 60,000 | 1953 |
| Louisville Gas and Electric | Paddys Run; Louisville | S | 60,000 | 1952 |
| | Cane Run, Louisville | S | 100,000 | 1954 |
| Pub Service Co of Indiana | Wabash River; Terre Haute | S | 90,000 | 1952 |
| | | S | 90,000 | 1953 |
| | | S | 90,000 | 1954 |
| | | S | 90,000 | 1954 |
| Richmond, Ind Municipal | | S | 30,000 | 1954 |
| South Indiana Gas & Elec | Cully; Yankeetown | S | 40,000 | 1955 |
| | **Total Region II** | | **4,715,750** | |
| **REGION III** | | | | |
| Virginia Elec & Pwr | Chesterfield; Richmond | S | 90,000 | 1952 |
| | Portsmouth; Norfolk | S | 90,000 | 1953 |
| | | S | 90,000 | 1954 |
| | Roanoke Rapids, N. C. | H | 27,000 | 1955 |
| | | H | 27,000 | 1955 |
| | | H | 27,000 | 1955 |
| | | H | 10,000 | 1955 |
| Federal | John H. Kerr, Roanoke R, Va. | H | 32,000 | 1952 |
| | (Formerly Buggs Island) | H | 32,000 | 1952 |
| | | H | 32,000 | 1952 |
| | | H | 32,000 | 1953 |
| | | H | 32,000 | 1953 |
| | | H | 32,000 | 1953 |
| Kentucky Utilities Co | Tyrone, Ky | S | 60,000 | 1952 |
| | Green R., S. Carrolton | S | 60,000 | 1953 |
| Owensboro, Ky Municipal | | S | 30,000 | 1953 |
| East Kentucky Rural Elec Co-op | New Plant | S | 20,000 | 1953 |
| | | S | 20,000 | 1953 |
| Tennessee Valley Authority | Tennessee R; Hales Bar | H | 24,300 | 1952 |
| | Pickwick | H | 36,000 | 1952 |
| | | H | 36,000 | 1952 |
| | Cumberland R, Ky; Wolf Creek | H | 45,000 | 1952 |

Symbols: GT—Gas turbine; S—Steam
H—Hydro; IC—Internal Combustion

# To Be Installed 1952-55

| System | Plant & Location | Type | Capacity Kw | To Be Completed |
|---|---|---|---|---|
| Tennessee Valley Authority | Cumberland Basin, Old Hickory | H | 25,000 | 1954 |
| | | H | 25,000 | 1955 |
| | | H | 25,000 | 1955 |
| | | H | 25,000 | 1955 |
| | Obey River; Dale Hollow | H | 18,000 | 1953 |
| | Fontana Little Tenn. R, N. C.; | H | 67,500 | 1953 |
| | So Holston R; Boone | H | 25,000 | 1952 |
| | | H | 25,000 | 1953 |
| | | H | 25,000 | 1953 |
| | Ft. Patrick Henry | H | 18,000 | 1954 |
| | | H | 18,000 | 1954 |
| | Holston River, Cherokee | H | 30,000 | 1953 |
| | | H | 30,000 | 1953 |
| | French Broad R; Douglas | H | 26,000 | 1954 |
| | Bear Creek | H | 9,000 | 1953 |
| | Cedar Cliff | H | 6,375 | 1952 |
| | Tenn Creek | H | 10,000 | 1953 |
| | Nottely River, Ga; Nottely | H | 14,000 | 1955 |
| | Hiwassee River; Hiwassee | H | 57,600 | 1955 |
| | Chatuge | H | 10,000 | 1954 |
| | Johnsonville; Johnsonville, Tenn. | S | 119,500 | 1952 |
| | | S | 119,500 | 1953 |
| | Bridgeport; Widows Creek, Ala. | S | 119,500 | 1952 |
| | | S | 119,500 | 1952 |
| | | S | 119,500 | 1952 |
| | | S | 119,500 | 1954 |
| | | S | 119,500 | 1954 |
| | Paducah; Swanee, Ala. | S | 135,000 | 1953 |
| | | S | 135,000 | 1953 |
| | | S | 135,000 | 1953 |
| | | S | 135,000 | 1953 |
| | | S | 135,000 | 1954 |
| | | S | 135,000 | 1954 |
| | | S | 135,000 | 1954 |
| | | S | 135,000 | 1954 |
| | | S | 135,000 | 1954 |
| | | S | 135,000 | 1955 |
| | Kingston; Swans Pond, Tenn. | S | 135,000 | 1953 |
| | | S | 135,000 | 1953 |
| | | S | 135,000 | 1953 |
| | | S | 135,000 | 1953 |
| | | S | 180,000 | 1954 |
| | | S | 180,000 | 1954 |
| | | S | 180,000 | 1955 |
| | Colbert; Colbert, Ala | S | 180,000 | 1955 |
| | | S | 180,000 | 1954 |
| | | S | 180,000 | 1954 |
| | | S | 180,000 | 1954 |
| | | S | 180,000 | 1954 |
| | Rogerville | S | 180,000 | 1955 |
| | | S | 180,000 | 1955 |
| | Gallatin | S | 225,000 | 1955 |
| Carolina Power & Light | Lumberton Sta, N. C. | S | 62,500 | 1952 |
| Duke Power | Riverbend; Charlotte, N. C. | S | 100,000 | 1952 |
| | | S | 100,000 | 1952 |
| | | S | 133,000 | 1954 |
| | | S | 133,000 | 1954 |
| | Buck; Spencer, N. C. | S | 125,000 | 1953 |
| | | S | 125,000 | 1953 |
| Alabama Power | J. M. Barry; Mobile | S | 125,000 | 1953 |
| | | S | 125,000 | 1954 |
| | Unassigned | S | 125,000 | 1955 |
| Georgia Power | Yates; Whitesburg | S | 100,000 | 1952 |
| | McManus; Brunswick | S | 40,000 | 1952 |
| | Sinclair; Oconee, River | H | 22,500 | 1952 |
| | | H | 22,500 | 1952 |
| | Hammond, Rome | S | 100,000 | 1953 |
| | | S | 100,000 | 1954 |
| | | S | 100,000 | 1954 |
| Gulf Power | Pensacola | S | 30,000 | 1952 |
| | River Junction | S | 40,000 | 1952 |
| | | S | 40,000 | 1953 |
| Mississippi Power | Sweatt; Meridian | S | 40,000 | 1953 |
| Alabama Elec Co-op | Gantt; Gantt | S | 7,500 | 1953 |
| | | S | 7,500 | 1953 |
| Savannah Elec Pwr | Riverside Pt., Ga | S | 20,000 | 1954 |
| Buford Federal Plant | Chattahoochee R; Buford, Ga. | H | 40,000 | 1955 |
| Clark Hill—Federal | Savannah River; Ga/S. C. | H | 40,000 | 1952 |
| | | H | 40,000 | 1953 |
| | | H | 40,000 | 1953 |
| | | H | 40,000 | 1953 |
| | | H | 40,000 | 1954 |
| | | H | 40,000 | 1954 |
| | | H | 40,000 | 1954 |
| Florida Power & Light | Cutler, Fla | S | 56,470 | 1952 |
| | Riveria, Fla | S | 56,470 | 1953 |
| Florida Power | Avon Park | S | 40,000 | 1952 |
| | Suwannee; Ellsville | S | 30,000 | 1952 |
| | | S | 30,000 | 1954 |
| Florida power | Higgens; Safety Harbor | S | 40,000 | 1953 |
| | | S | 40,000 | 1953 |
| Orlando, Fla Municipal | | S | 30,000 | 1953 |
| Tallahassee, Fla Municipal | St. Marks | S | 7,500 | 1954 |
| Tampa Electric | Hookers Point, Fla | S | 40,000 | 1953 |
| Jim Woodruff—Federal | Apalachicola, Fla | H | 10,000 | 1954 |
| | | H | 10,000 | 1954 |
| | | H | 10,000 | 1954 |
| | **Total Region III** | | **8,639,915** | |

## REGION IV

| System | Plant & Location | Type | Capacity Kw | To Be Completed |
|---|---|---|---|---|
| Madison Gas & Electric | Blount St., Madison, Wis | S | 30,000 | 1953 |
| Wisconsin Electric Power | Oak Creek | S | 120,000 | 1952 |
| | | S | 120,000 | 1954 |
| Wisconsin Michigan Power | Hemlock Flls, Michigame R. | H | 9,800 | 1952 |
| | Michigame Flls, Michigame R. | H | 9,600 | 1952 |
| Wisconsin Power & Light Co | Rock River Plant, Beloit | S | 60,000 | 1953 |
| | | S | 60,000 | 1955 |
| Wisconsin Public Service | Weston; Rothchild | S | 60,000 | 1954 |
| Central Ill. Electric & Gas | Sebrooke, Rockford | S | 30,000 | 1952 |
| | | S | 30,000 | 1954 |
| Commonwealth Edison | Ridgeland, Ill | S | 150,000 | 1953 |
| | | S | 150,000 | 1953 |
| | Dixon, Ill | S | 60,000 | 1953 |
| | Will County, Ill | S | 150,000 | 1954 |
| | | S | 150,000 | 1954 |
| Union Elec of Mo | Meramec; St. Louis, Mo | S | 110,000 | 1953 |
| | | S | 110,000 | 1953 |
| | Osage, Osage River, Mo | H | 21,500 | 1953 |
| | | H | 21,500 | 1953 |
| Dairyland Power Co-op | Stoneman, Cassville, Wis | S | 34,500 | 1953 |
| Lake Superior Dist Power | Bay Front; Ashland, Wis | S | 20,000 | 1952 |
| Minn. Power and Light | Aurora, Minn | S | 44,000 | 1953 |
| | | S | 44,000 | 1953 |
| Rochester, Minn Municipal | Silver Lake | S | 11,500 | 1953 |
| Northern States Power | Black Dog; Minneapolis | S | 60,000 | 1952 |
| | | S | 90,000 | 1954 |
| | Minn. Valley, Granite Falls | S | 40,000 | 1953 |
| Corn Belt Power Cooperative | Humbolt; Humbolt, Iowa | S | 15,000 | 1953 |
| Iowa/Ill Gas & Elec | Moline; Moline, Ill | S | 20,000 | 1953 |
| Iowa Power & Light | Sta S; Des Moines | S | 60,000 | 1953 |
| | Cecil Bluff; Cecil Bluff | S | 40,000 | 1953 |
| Interstate Power Co | Dubuque, Iowa | S | 25,000 | 1952 |
| | Lansing, Iowa | S | 30,000 | 1955 |
| Iowa Elec Light & Pwr | Boone, Iowa | S | 15,000 | 1952 |
| | Marshalltown | S | 30,000 | 1954 |
| | | S | 30,000 | 1955 |
| Iowa Public Service Co | Carroll, Iowa | S | 5,000 | 1952 |
| | Hawkeye; Storm Lake | S | 11,500 | 1953 |
| Iowa Southern Utilities | Bridgeport; Eddyville | S | 20,000 | 1952 |
| | | S | 20,000 | 1953 |
| Central Illinois Light | R. S. Wallace; Peoria, Ill | S | 60,000 | 1952 |
| Central Illinois Public Service | Hutsonville | S | 60,000 | 1952 |
| | | S | 60,000 | 1953 |
| Electric Energy Inc | Joppa, Ill | S | 156,000 | 1953 |
| | | S | 156,000 | 1953 |
| | | S | 156,000 | 1953 |
| | | S | 156,000 | 1953 |
| Illinois Power Co | Wood River; Wood River | S | 90,000 | 1953 |
| | Hennepin, Ill | S | 60,000 | 1953 |
| Springfield, Ill Municipal | Lakeside; Springfield | S | 20,000 | 1952 |
| | **Total Region IV** | | **3,084,900** | |

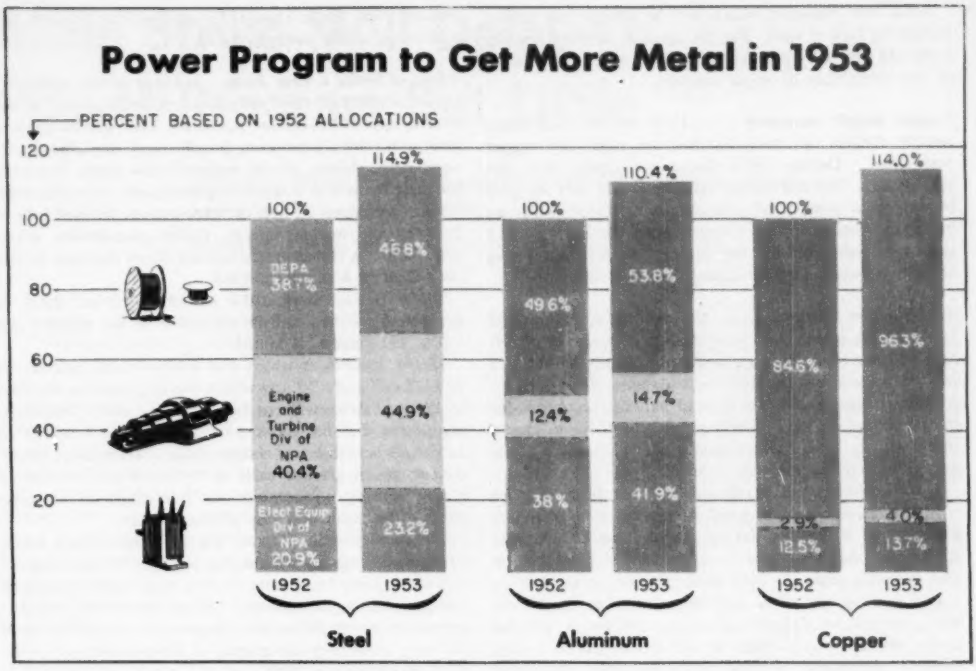
## REGION V

| System | Plant & Location | Type | Capacity Kw | To Be Completed |
|---|---|---|---|---|
| Arkansas Power & Light | Lake Catherine, Hot Sprgs | S | 99,000 | 1952 |
| | Lynch | S | 125,000 | 1953 |
| | Couch | S | 125,000 | 1953 |
| Louisiana Power & Light | Nine Mile Pt; Westwego | S | 99,000 | 1952 |
| Miss Power and Light | Delta; Cleveland | S | 99,000 | 1953 |
| | | S | 99,000 | 1953 |
| New Orleans Public Serv | Ind Canal; New Orleans | S | 65,000 | 1954 |
| Arkansas Missouri Power | Jim Hill; Campbell | S | 30,000 | 1954 |
| Central Louisiana Electric | Coughlin; St. Landry | S | 20,000 | 1952 |
| | Teche; Baldwin | S | 20,000 | 1953 |
| Bull Shoals—Federal | White River Ark/Mo | H | 40,000 | 1952 |
| | | H | 40,000 | 1952 |
| | | H | 40,000 | 1952 |
| | | H | 40,000 | 1952 |
| Bakely Mountain—Federal | Ouachita River, Ark: | H | 37,500 | 1954 |
| | | H | 37,500 | 1954 |
| Oklahoma Gas & Elec | South; Sulphur | S | 60,000 | 1953 |
| Public Service Co of Oklahoma | Southwestern; Carnegie | S | 75,000 | 1954 |
| | McAlester; McAlester | GT | 15,000 | 1954 |

PLEASE TURN PAGE

# New Generating Facilities 1952-1955 (continued)

| System | Plant & Location | Type | Capacity Kw | To Be Completed |
|---|---|---|---|---|
| Grand River Dam Authority | Pensacola; Grand R, Okla | H | 14,400 | 1952 |
| Tenbitlter Ferry | Illinois R, Okla—Fedl | H | 17,000 | 1953 |
| | | H | 17,000 | 1953 |
| Fort Gibson | Grand R, Okla—Fedl | H | 11,250 | 1953 |
| | | H | 11,250 | 1953 |
| | | H | 11,250 | 1953 |
| | | H | 11,250 | 1953 |
| Gulf States Utilities | Louisiana Street; Baton Rouge | S | 60,000 | 1953 |
| | | S | 40,000 | 1953 |
| | | S | 40,000 | 1954 |
| | Nelson; Scott | S | 60,000 | 1954 |
| Lubbock, Tex, Municipal | Plant No. 2 | S | 11,500 | 1952 |
| | | S | 11,500 | 1953 |
| Southwestern Public Service | Plant X; Amherst, Texas | S | 80,000 | 1953 |
| | Carlsbad; Carlsbad, N. M. | S | 16,000 | 1952 |
| Dallas Power and Light | Southeast; Dallas | S | 60,000 | 1954 |
| | Parkdale; East Dallas | S | 65,600 | 1953 |
| | | S | 80,000 | 1955 |
| Texas Power and Light | Dixon Street; Gainesville | GT | 3,500 | 1952 |
| | Lake Creek; Waco | S | 65,600 | 1953 |
| | River Crest | S | 80,000 | 1954 |
| | | S | 80,000 | 1955 |
| Texas Electric Service | Morgan Creek; Colo City | S | 60,000 | 1954 |
| | Tarrant County | S | 115,000 | 1954 |
| Southwestern Gas & Elec | Daingerfield, Texas | S | 40,000 | 1954 |
| W. Texas Utilities | Ft. Stockton | S | 5,000 | 1952 |
| | Concho; San Angelo | S | 30,000 | 1953 |
| | Stamford; Stamford | S | 30,000 | 1953 |
| Whitney Fedl | Brazos River | H | 15,000 | 1953 |
| | | H | 15,000 | 1953 |
| Austin Tex, Municipal | | S | 22,000 | 1954 |
| | | S | 22,000 | 1955 |
| Central Power and Light | Victoria; Victoria, Tex | S | 30,000 | 1952 |
| | | S | 30,000 | 1955 |
| | Calallen; Calallen | S | 60,000 | 1954 |
| | Laredo; Laredo | S | 30,000 | 1955 |
| Houston Lighting & Pwr | Greens Bayou; Houston | S | 100,000 | 1952 |
| | | S | 100,000 | 1953 |
| | Webster; Webster | S | 100,000 | 1953 |
| | | S | 100,000 | 1954 |
| San Antonio, Municipal | Leon Creek | S | 60,000 | 1953 |
| | Fourthside Sta | S | 60,000 | 1954 |
| Int'l Boundary WaterComm | Falcon Rio Grande R, Tex | H | 10,500 | 1954 |
| | | H | 10,500 | 1954 |
| | | H | 10,500 | 1954 |
| Community Pub Serv | Lordsburg; Silver City | S | 20,000 | 1954 |
| El Paso Electric | El Paso | S | 40,000 | 1954 |
| Pub Serv of New Mexico | Person; Albuquerque | S | 20,000 | 1952 |
| | | S | 20,000 | 1953 |
| | **Total Region V** | | **3,163,600** | |
| **REGION VI** | | | | |
| Central Pwr and Elec Co-op | W. J. Neal; Voltaire, N. D. | S | 15,000 | 1952 |
| | | S | 15,000 | 1952 |
| Northwestern Pub Serv | Armour, S. D. | IC | 1,480 | 1952 |
| Garrison—Federal | Missouri R, N. D. | H | 80,000 | 1955 |
| | | H | 80,000 | 1955 |
| Fort Randall—Federal | Missouri R, S. D. | H | 40,000 | 1953 |
| | | H | 40,000 | 1954 |
| | | H | 40,000 | 1954 |
| | | H | 40,000 | 1954 |
| | | H | 40,000 | 1955 |
| | | H | 40,000 | 1955 |
| | | H | 40,000 | 1955 |
| Omaha Pub Power Dist | North Omaha | S | 60,000 | 1953 |
| Central Kansas Power | Ross Beach; Hill City | S | 11,500 | 1953 |
| Kansas City, Kan Municipal | Quindaro | S | 30,000 | 1952 |
| Kansas Power & Light | Lawrence; Lawrence | S | 30,000 | 1952 |
| | Unassigned | S | 50,000 | 1954 |
| Missouri Public Service | Pleasant Hill | S | 22,000 | 1953 |
| Kansas City Pwr & Lgt | Hawthorne; Kansas City, Mo | S | 90,000 | 1953 |
| Boysen—Federal | Big Horn R, Wyo | H | 7,500 | 1952 |
| | | H | 7,500 | 1952 |
| Alcova—Federal | No. Platte R, Wyo | H | 18,000 | 1954 |
| | | H | 18,000 | 1954 |
| Pole Hill—Federal | Colorado/Big Thompson Diversion Canal | H | 16,400 | 1953 |
| | | H | 16,400 | 1953 |
| Flatiron Mt—Federal | Big Thompson Diversion Canal | H | 31,500 | 1953 |
| | | H | 31,500 | 1953 |
| Colorado Spgs Colo Municipal | North | S | 15,000 | 1952 |
| | | S | 15,000 | 1953 |
| Public Serv of Colo | Alamosa | S | 10,000 | 1953 |
| | Zuni; Denver | S | 66,000 | 1953 |
| | | S | 80,000 | 1954 |
| Western Colorado Power | Jim Bullock; Montrose | S | 5,000 | 1953 |
| Empire District Elec | Riverton; Riverton, Kan | S | 40,000 | 1953 |
| Kansas Gas & Elec | Murray Gill; Wichita | S | 60,000 | 1953 |
| | | S | 60,000 | 1954 |
| | **Total Region VI** | | **1,163,780** | |
| **REGION VII** | | | | |
| Montana Power | Kerr Plant; Flathead R | H | 56,000 | 1954 |
| Canyon Ferry—Fedl | Missouri River, Mont | H | 16,666 | 1953 |
| | | H | 16,666 | 1953 |
| | | H | 16,666 | 1953 |
| Utah Power and Light | Gadsby; Salt Lake City | S | 60,000 | 1952 |
| Idaho Power | Dike; Snake River | H | 20,000 | 1954 |
| | | H | 20,000 | 1954 |
| | | H | 20,000 | 1954 |
| Pacific Power & Light | Yale; Lewis R, Wash | H | 54,000 | 1952 |
| | | H | 54,000 | 1952 |
| Portland General Electric | Sta B, Clackamas R, Ore | H | 15,000 | 1952 |
| Washington Water Power | Cabinet Gorge; Clrk Fk R, Idaho | H | 50,000 | 1952 |
| | | H | 50,000 | 1952 |
| | | H | 50,000 | 1952 |
| | | H | 50,000 | 1953 |
| Pend Oreille County | Box Canyon; Pend Oreille R, Wash | H | 15,000 | 1953 |
| | | H | 15,000 | 1953 |
| | | H | 15,000 | 1953 |
| | | H | 15,000 | 1953 |
| Chief Joseph—Federal | Columbia River | H | 64,000 | 1955 |
| | | H | 64,000 | 1955 |
| | | H | 64,000 | 1955 |
| | | H | 64,000 | 1955 |
| McNary—Federal | Columbia R, Wash/Ore | H | 70,000 | 1953 |
| | | H | 70,000 | 1953 |
| | | H | 70,000 | 1954 |
| | | H | 70,000 | 1954 |
| | | H | 70,000 | 1954 |
| | | H | 70,000 | 1954 |
| | | H | 70,000 | 1955 |
| | | H | 70,000 | 1955 |
| | | H | 70,000 | 1955 |
| Hungry Horse—Federal | Flathead R, Mont | H | 72,250 | 1952 |
| | | H | 72,250 | 1952 |
| | | H | 72,250 | 1953 |
| | | H | 72,250 | 1953 |
| Albeni Falls—Federal | Pend Oreille R, Idaho | H | 14,000 | 1954 |
| | | H | 14,000 | 1954 |
| | | H | 14,000 | 1954 |
| Chandler—Federal | Kennewick Canal, Wash | H | 6,000 | 1955 |
| | | H | 6,000 | 1955 |
| Chelan County, Wash | Rock I. Columbia R, Wash | H | 22,500 | 1952 |
| | | H | 22,500 | 1952 |
| | | H | 22,500 | 1952 |
| | | H | 22,500 | 1953 |
| | | H | 22,500 | 1953 |
| Seattle, Municipal | Ross; Skagit | H | 90,000 | 1952 |
| | | H | 90,000 | 1953 |
| | | H | 90,000 | 1953 |
| Tacoma, Municipal | Cushman No. 2; Snohomish | H | 27,000 | 1952 |
| California-Oregon Power | Clearwater, North Umpqua R, Ore | H | 15,000 | 1952 |
| | | H | 26,000 | 1953 |
| | Lemlo, North Umpqua R, | H | 25,000 | 1953 |
| | | H | 35,000 | 1954 |
| | Big Bend 2; Klamath R, Ore. | H | 50,000 | 1955 |
| | Steam plant, Ore | S | 20,000 | 1954 |
| Mountain States Power | Coos Bay System | S | 15,000 | 1954 |
| Detroit—Federal | N. Santiam R, Ore | H | 50,000 | 1953 |
| | | H | 50,000 | 1953 |
| Big Cliff—Federal | North Santiam River, Ore | H | 18,000 | 1953 |
| Lookout Point—Federal | Willamette R, Ore | H | 38,333 | 1954 |
| | | H | 38,333 | 1954 |
| | | H | 38,333 | 1954 |
| Dexter—Federal | Willamette R, Ore | H | 15,000 | 1954 |
| | **Total Region VII** | | **2,759,000** | |
| **REGION VIII** | | | | |
| Pacific Gas & Elec | Moss Landing; Moss Landing | S | 100,000 | 1952 |
| | | S | 100,000 | 1952 |
| | Contra Costa | S | 100,000 | 1953 |
| | | S | 100,000 | 1953 |
| | Pittsburg | S | 125,000 | 1953 |
| | | S | 125,000 | 1953 |
| | | S | 125,000 | 1954 |
| | | S | 125,000 | 1954 |
| | Eureka | S | 50,000 | 1955 |
| | Unassigned | S | 125,000 | 1955 |
| | | S | 125,000 | 1955 |
| | Bear River Dam, Bear R | H | 29,700 | 1952 |
| | Murphys, King R | H | 3,600 | 1953 |
| | Pitt No. 4; Kings R | H | 90,000 | 1955 |
| Central Valley Project—Fedl | Folsom; American River | H | 54,000 | 1954 |
| | | H | 54,000 | 1954 |
| | | H | 54,000 | 1955 |
| | Nimbus; American R, Calif | H | 6,750 | 1955 |
| | | H | 6,750 | 1955 |
| Burbank, Cal, Municipal | | S | 30,000 | 1953 |
| California Electric Power | Highgrove; San Bernardo | S | 40,000 | 1953 |
| Glendale, Cal, Municipal | | S | 20,000 | 1953 |
| Imperial Irrigation Dist | Calif/El Centro | S | 30,000 | 1952 |
| | Drop No. 2—All Amer. Canal | H | 5,000 | 1953 |
| | | H | 5,000 | 1953 |
| Pasadena, Municipal | Broadway | S | 40,000 | 1953 |
| Los Angeles, Municipal | Owens R Gorge; Owens R | H | 37,500 | 1952 |
| | Valley Steam Pl; Seal Beach | S | 80,000 | 1953 |
| | | S | 80,000 | 1953 |
| | | S | 125,000 | 1954 |
| San Diego Gas & Elec | Silver Gate | S | 50,000 | 1952 |
| Southern California Edison | Etiwanda, Fontana | S | 100,000 | 1953 |
| | | S | 100,000 | 1953 |
| | Redondo No. 2; Redondo | S | 125,000 | 1954 |
| | | S | 125,000 | 1954 |
| Arizona Public Service | Saguaro; Red Rock | S | 90,000 | 1954 |
| Salt River Power Dist | Arizona Kyrene, Ariz | S | 69,000 | 1954 |
| Tucson Gas Elec Lgt & Pwr | Des Moss Petrie; Tucson | S | 20,000 | 1953 |
| | | S | 40,000 | 1954 |
| | **Total Region VIII** | | **2,700,300** | |
| | **Total United States** | | **31,778,945** | |




**Materials For Power Program in 1952 and 1953**

| | Steel—Tons | | Copper—1000 lb | | Aluminum—1000 lb | |
|---|---|---|---|---|---|---|
| | 1952 | 1953 est | 1952 | 1953 est | 1952 | 1953 est |
| DEPA | 1,032,626 | 1,250,000 | 253,766 | 275,000 | 210,574 | 240,000 |
| Engine & Turbine Division of NPA | 1,080,000 | 1,200,000 | 63,500 | 75,000 | 7,300 | 10,000 |
| Electrical Equipment Division of NPA | 560,000 | 616,000 | 194,000 | 214,000 | 31,200 | 34,200 |
| **Total** | **2,672,626** | **3,066,000** | **511,266** | **564,000** | **249,074** | **284,000** |

Notes:
No stainless steel included. Amount is small and data not continuously on same basis.
For ETD materials estimates include one half of heat exchangers, water treating equipment and fabricated pipe.
No tank material is included.
For EED minor adjustments made in transformers, rectifiers, etc.

# More Materials in Sight for 1953—But...

**. . . the 1953 program will travel a rough road as manufacturing and construction feel the effect of the steel strike**

**J. WARREN McLAUGHLIN**
Power Specialist,
Defense Production Administration

The steel strike has clouded the skies above electric utilities seeking steel and equipment for their huge expansion program. But here and there are a few bright clouds indicating that aluminum and copper will present no major problems.

The outlook for the 1953 power program is a dual one—that for construction of generating plants and other outside work and that for heavy equipment.

Because of the shortage of structural shapes and bars for foundation work the effect of the steel strike was felt most quickly in outside construction work. But such construction can recover more quickly than equipment production. Manufacturers of turbines, boilers, condensers, and other heavy equipment with long lead-time and complex manufacturing cycles will not feel the effect of the shortage so quickly. The castings, forgings, etc, now in factories require months to machine and finish.

**Aluminum Will Be Comparatively Abundant . . .** Of the three CMP metals—steel, copper, and aluminum—the last will probably be in comparative abundant supply in 1953. It is expected that it will be available in quantities adequate for the power program. Although only 40% of the aluminum expansion program has been completed, production is at a record high and will grow even greater soon. Spotty power shortages are impeding output somewhat, but these are normal and are taken into consideration in making estimates of annual production.

Some new reduction plants will be delayed for several months by lack of steel. But the amounts of metal coming from old and new potlines should reassure the industry on the availability of ample supplies.

**Copper Supply Increases . . .** Prior to the steel strike electric utilities had been touched but lightly by copper restrictions. During 1953 domestic supplies will rise very slowly. But the higher price that can now be paid for imported copper will attract more of the metal and boost the total supply. Copper available during 1953 should be adequate for the power industry, but prices of some products may be higher than in 1952.

**Steel Supplies a Question . . .** Although accurate appraisal of the effects of the steel strike is difficult to make, shortages of some steel items are certain to plague the industry for many months. Military and Atomic Energy Commission programs will take a large part of the output for the remainder of 1952. But it seems reasonable to expect that early in 1953 the commonly needed items of steel should become more readily available.

Unfortunately steel production at this time may be curtailed because of a shortage of ore resulting from the cessation of shipments during the steel strike. A long coal strike this year would reduce supplies of coking coal and also affect the steel available next spring.

For both construction and manufacturing, steel bars will probably be difficult to obtain. Shortages will be severe and will cause delays all out of proportion to the physical percentage of these items on jobs. Structural shapes will be hard to get particularly in the larger sizes.

High-pressure, high-temperature, thick-wall pipe will continue to be in tight supply for the next few months. But few jobs should suffer extended delays. If tubing manufacturers cannot make delivery, many fabricators will roll plate into pipe and machine it to required sizes. Lack of tube rounds will delay boiler tubing.

Boiler drums will be a most troublesome item. There is only one steel mill in the country that can roll the extra thick plate needed for high-pressure drums. Present indications are that boilers scheduled for delivery in early 1953 and for which drum plates are not now in the shops will be delayed three to four months. These delays will affect spinning dates of generators in late 1953 and early 1954.

In each emergency when an extraordinary demand develops for very large steel castings and forgings, a shortage of casting and soaking pits bedevils the steel industry. The present time is no exception. It seems likely that the power industry will find it necssary to resort to the use of conversion steel to an unusual degree during 1953.

**Stainless Steel Supply Depends Upon Alloy . . .** With chromite no longer a limiting factor, the supply of nickel for stainless steel remains troublesome. Present nickel production is barely adequate, and only a modest improvement can be expected in 1953. Alloys containing nickel will be severely restricted, but the power program will not suffer to any considerable extent.

Large forgings, especially those for turbines and generators, require a great deal of nickel. But because these were not made during the steel strike, there may be a larger supply of nickel available for some time.

Supplies of columbium, tantalum, titanium, magnesium, molybdenum, tungsten, and other alloying agents will be limited. But these should be adequate to prevent any real delays to the power program.

**Effect of Strike a Year Away . . .** Large power equipment under fabrication when the steel strike started will be delivered approximately on schedule. This applies particularly to turbines, generators, transformers, and other heavy equipment. Much of the material now being processed for these items is in a semi-completed state. Manufacturers will be hampered by half or three-quarter finished jobs in factories and working spaces. Boilers, condensers, generators, and big transformers are not items that can be put on a shelf or in a storage yard.

Effect of the steel strike on the in-service dates of generating facilities will be noticeable in the summer and fall of 1953 and early in 1954.

Heavy equipment which was scheduled for delivery in late '52 and early '53 and which was in process at the time of the steel strike will not be affected seriously. However, equipment due for delivery in the summer and fall of 1953 will be subject to serious delays. Generators scheduled to go on the line early in 1953 will not be affected greatly but by mid-summer the full effects of the steel strike of last June and July will be evident.

The impact of the Atomic Energy Commission's newly announced program will be felt strongly by the industry and particularly by makers of very large power-producing and power-using equipment. This program will probably necessitate rescheduling of a number of generating units and may result in pushing some of the less essential generators of power into 1955.

**Slippage an Old Story . . .** Lack of materials alone will not cause all of the in-service delays. They existed in most favorable peacetime conditions. Such delays include those caused by failure to place purchase orders on time or failure to approve manufacturing drawings. Such failures are doubly serious at this time because the tight manufacturing schedules of most plants do not permit making up lost time. A plant working at full capacity can't work any faster or any more.

A generating plant recently went into service with clamshell buckets loading coal into the hoppers because of delay in approval of engineering drawings. Another plant scheduled for 1953 operation will use the same makeshift arrangement for the same reason. Cranes and other moderate-sized equipment can cause serious delays.

**NPA and the Power Program . . .** The power program may suffer slightly because it is in competition to a considerable extent with some high-priority programs such as jet engines, ordnance, etc. National Production Authority policy in regard to the power program for 1953 is to give it no special preference. Spot assistance may be given to critical items which might delay important jobs.

The military and AEC will get first call on materials until their programs are back on schedule. This may not be so serious as it seems, but the impact is certain to last several months. The large generating plants being erected to supply AEC plants will at times encounter difficulty because of the extraordinary amounts of equipment involved. They will probably require special attention to insure their operation on the dates when AEC will be ready to use the energy. That power supply will be difficult but not impossible.

# Steel Strike Will Delay Power Program But Little

**Effect of strike less than expected. Delay in delivery of major components of 1953 and early 1954 to be only one or two months. In 1952 deliveries will be on schedule, with but few exceptions**

**J. J. HUETHER**
Manager, Electric Utility Sales, General Electric Co

Manufacturers of power apparatus have been seriously concerned with the interruption in the flow of steel caused by the steel strike. Their problem is less the immediate effect of the strike in 1952 than it is the effect on production and delivery of apparatus for power expansion projects one or two years hence. The effect of the steel strike on deliveries from the General Electric Co may well be typical of the electrical manufacturing industry as a whole.

Prior to the steel strike shipments were, with few exceptions, made according to schedule. It appears that 1952 delivery schedules will be met in like manner.

Present indications are that, barring emergencies, delays in delivery of electrical apparatus for power expansion projects will be less than previously feared, and should not be more than two months. In spite of the steel strike, it appears that electrical apparatus will not be the limiting factor in getting new generating capacity on the line, except possibly in a few isolated cases.

All industries using steel in construction or manufacturing will feel the effects of the strike to some extent. But steel supplies, both on hand and on order, are being analyzed with extreme care to keep any adjustment of previously established schedules to a minimum.

The situation varies to some extent for each type of electrical apparatus. For example, supplies of silicon steel for power transformers and steel plate for transformer tanks differ from the supply of forgings and castings for turbine-generators.

At present the conclusions concerning General Electric Co products, which are needed in power expansion projects may be stated as follows:

**Large Steam Turbines** . . . With few exceptions, turbine shipments during the remainder of 1952 will be made in accordance with schedules which were in effect April 1, 1952. Shipments of these machines may possibly be delayed, but not more than two months. Production during 1953 may be short of previous schedules by as much as 800,000 kw, but the total production will exceed that of 1952. In general, extension of delivery schedules in 1953 and early 1954 will be no more than one or two months. By the end of 1954, all losses in output caused by the steel strike should be made up.

**Hydro Turbine Generators** . . . With few exceptions, shipment of hydro turbine-driven generators will be made in accordance with schedules in effect January 1, 1952. It is not expected that production during 1953 will be reduced because of the steel strike.

**Power Transformers** . . . The 1952 production of power transformers is expected to fall short of previous schedules by approximately 15%. This may mean as much as a two-month delay in delivery of some units, since shipping schedules will have to be revised because of the production losses already incurred. Full production goals should be met in 1953 and thereafter.

**Switchgear** . . . Special steels are generally not required in the manufacture of switchgear. As a result, switchgear manufacturing operations were negligibly affected by the steel strike, and production and shipments should proceed on schedule.

**Oil Circuit Breakers** . . . The situation for this type of equipment is the same as for other switchgear. Shipments improved materially during the first half of 1952, and the situation was not changed by the steel strike because special steels are not used to any great extent.

**Motors** . . . Shipment of large induction motors for power plant auxiliary drives is running at a pace to match construction requirements.

**In Summary** . . . Deliveries were well up to schedule, for the most part, prior to the steel strike. The effect of the steel strike is not so great as was first indicated, and extension of delivery of major components of power expansion projects will be only one to two months, in most cases, during 1953 and early 1954.

A major problem in meeting established production schedules is the continuing possibility of changes in suppliers' schedules caused by requirements of the direct defense program.

Disruption of production schedules has been a common experience for manufacturers in recent months. Overall coordination of component delivery schedules relating to power expansion projects is vitally important to the industry as a whole.

Thorough understanding of mutual problems on the part of the manufacturer and his customer is necessary for setting up satisfactory production and delivery schedules.

On the other hand, adequate allocation of materials to the electric power industry and the assignment of specific items to specific projects within the industry will aid greatly in stabilizing the production and delivery of apparatus for power projects.

# Utilities Will Triple Coal Tonnage

**Prospective demands on systems may require 300 million tons despite probable further gains in thermal performance, and coal will remain the dominant fuel for power generation**

The electric utility heat rate has dropped from 92,000 Btu per kwhr at the turn of the century to 15,200 Btu per kwhr in 1951. This reduction of 76,800 Btu or 83% in 51 years has been achieved by the painstaking perfection of fuel-saving devices and methods and improvements in conversion efficiency.

Progress in the heat rate over the first half of the century has largely served to offset the advancing price of fuel (Table I) during the same period. If there had been no progress, the fuel cost would have advanced from 3.7 mills per kwhr in 1900 to 17.2 mills per kwhr in 1950 or a rise of 360%.

There was present, however, the offsetting influence of the advancing efficiency. In reality the cost for fuel, expressed as mills per kwhr, instead of rising actually dropped from 3.7 mills in 1900 to 2.9 mills in 1950. The power engineer can lay claim to most of the credit for this remarkable contribution. Without it the cost for fuel per kilowatt hour today would be 460% of the 1900 price instead of the actual 78%.

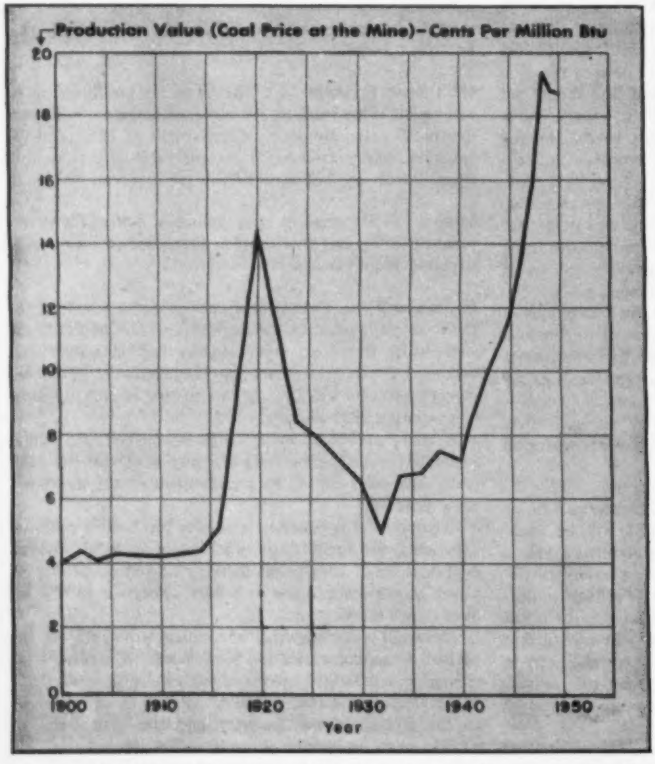



FIG 1—IN 50 YEARS coal (bituminous and lignite) rose from 4 to 19¢ per million Btu after hitting 14.50¢ in 1920 and dipping to 5¢ in 1934. (Bureau of Mines Minerals Year Book)

**Unit System . . .** Development of the unit system, without spare boilers and in ever increasing sizes, has led to such improvements in the use of space as to reduce the building volume requirements as shown by the data of Table II. Thus since the peak of development for the steam engine (1900) to the plants being built today for 100,000 — 200,000 kw units, the building volume has dropped from 300 to 25 cu ft per kw of capacity. Floor space has dropped in the same period from 2.5 to 0.2 sq ft per kw of capacity.

These reductions in building volume and floor space have contributed greatly to keeping the investment cost of plants within bounds. Despite the rising prices for buildings these reductions in space requirements have levelled down on the cost in dollars per kilowatt.

Advent of the large unit and development of the "one boiler serving one turbine" design have also had repercussions on the labor requirements for the operation and maintenance of generating plants. Table III gives some pertinent figures on this matter for designs which were currently modern in the years shown.

Despite the introduction of the 40-hour week the number of personnel required to run a steam-electric power plant has been so reduced that today one man will handle 2500 kw of capacity; whereas with the last word in reciprocating engine practice in 1900 one man was required for every 90 kw. This reduction has not been achieved by increase of size alone. The reliability of the equipment and the perfection of automatic controls have also contributed to the labor record.

A review of past practice in the

Excerpted from author's paper at the Centennial of Engineering in Chicago, Sept. 3-13, 1952.

# by 1970

**THEODORE BAUMEISTER,** Stevens Professor of Mechanical Engineering, Columbia University, New York

steam electric art is helpful in showing what has been done, but the real merit of that review rests in its help toward the future. A realistic objective might embrace a prognosis for five, ten, or twenty years—say to 1970. Beyond that date there is too much conjecture to warrant serious consideration.

As the initial step in an attempt to gain a glimpse of the future, official data have been manipulated so as to indicate what future loads might be for the electric utility systems of the country. In Fig 3 various load growth rates, ranging from 3 to 8% per annum have been applied to the generation figures as they obtained for 1950. Such rates are not without the bounds of reality. Curve A of Fig 3 uses the extrapolated per capita consumption trend of the last three decades; Curve B uses the same per capita consumption growth rate as prevailed during the last decade; and Curve C uses the average per capita consumption of the last three decades.

**How Big By 1970? . . .** The composite of data in Fig 3 serves to define the reasonable limits of growth so that by 1970 the annual electric utility generation of the United States should lie somewhere between the values of 600 and 1,500 billion kwhr. These limits are wide, and the per capita growth curves, A, B, and C, should help in a more rigorous delineation. C probably errs on the conservative side while A tends toward the opposite extreme. The most realistic figure in all likelihood rests then somewhere in the neighborhood of B or a little higher. This, in round numbers, would mean an annual electric utility generation of 1,000 billion kwhrs by 1970. The installed capacity needed to deliver this energy would be of the order of 200 million kw.

Many challenges might be directed

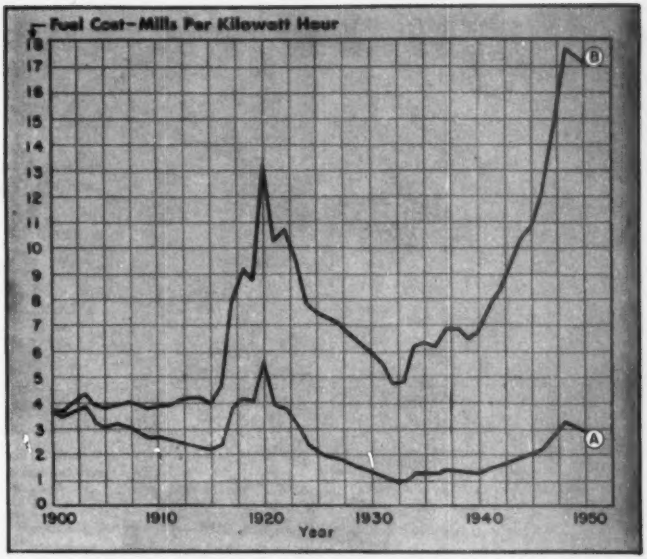



FIG 2—DESPITE RISE IN COST of fuel the fuel component of cost of a kwhr has actually dropped from 3.7 mills in 1900 to 2.9 mills in 1950 (Curve A). If there had been no improvement in the thermal efficiency (92,000 Btu/kwhr in 1900) fuel cost would be over 17 mills

**Table I—Value of Production (Coal Prices) for Bituminous Coal and Lignite Mining Industry**

United States 1900—1950

| Year | Production (Million tons) | Value of Production at Mine $ per ton | ¢ per Million Btu |
|---|---|---|---|
| 1900 | 212 | 1.04 | 4. |
| 1902 | 260 | 1.12 | 4.3 |
| 1904 | 279 | 1.10 | 4.2 |
| 1906 | 343 | 1.11 | 4.3 |
| 1908 | 333 | 1.12 | 4.3 |
| 1910 | 417 | 1.12 | 4.3 |
| 1912 | 450 | 1.15 | 4.4 |
| 1914 | 423 | 1.17 | 4.5 |
| 1916 | 503 | 1.32 | 5.1 |
| 1918 | 579 | 2.58 | 9.9 |
| 1920 | 569 | 3.75 | 14.4 |
| 1922 | 422 | 3.02 | 11.6 |
| 1924 | 484 | 2.20 | 8.5 |
| 1926 | 573 | 2.06 | 7.9 |
| 1928 | 501 | 1.86 | 7.2 |
| 1930 | 468 | 1.70 | 6.5 |
| 1932 | 310 | 1.31 | 5.0 |
| 1934 | 359 | 1.75 | 6.7 |
| 1936 | 439 | 1.76 | 6.8 |
| 1938 | 349 | 1.95 | 7.5 |
| 1940 | 461 | 1.91 | 7.3 |
| 1941 | 514 | 2.19 | 8.4 |
| 1942 | 583 | 2.36 | 9.1 |
| 1943 | 590 | 2.69 | 10.3 |
| 1944 | 620 | 2.92 | 11.2 |
| 1945 | 578 | 3.06 | 11.8 |
| 1946 | 534 | 3.44 | 13.2 |
| 1947 | 631 | 4.16 | 16.0 |
| 1948 | 600 | 4.99 | 19.2 |
| 1949 | 438 | 4.88 | 18.7 |
| 1950 | 512* | 4.85 | 18.6 |

* Preliminary—Based on coal with average heating value of 13,000 Btu per lb
Adapted from Bureau of Mines Minerals Yearbook

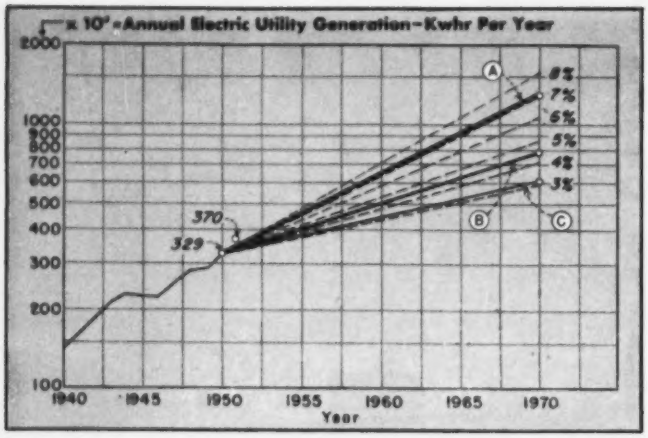



FIG 3—BY 1970 it is likely that utilities may be generating 1,500 billion kwhr annually. This is on an 8% growth rate or only 600 billion on a 3% growth rate. Curve A projects the trend of the last three decades, Curve B follows the trend of the 1940-50 decade, and Curve C is based on the average per capita consumption 1920-1950

toward the data of Fig 3 because they are not developed in alternative ways with more statistical exactness. Whatever values, however, are accepted for a reasonable estimate of the power load by 1970, it is evident that the engineering profession has a vast development program ahead of it. The logical questions which face the profession are these:

1. How will these expected loads be met?

2. What kind of generating plant will be built?

3. What will be the source of energy to deliver these capacities?

The prospects must, of course, include all sources of raw energy, to wit: elevated water supply, fossil fuels, the wind, the tides, the sun's rays, and nuclear fuel.

Any rational analysis undertaken to cover the next 15 or 20 years must proceed on the realities. It must not get very far from the realm of actuality and into the areas of unalloyed imagination. This means that the emphasis in the near future will continue to be upon water power and fossil fuels, especially coal. Some progress can be anticipated in the direction of atomic power, and there will doubtlessly be increasing efforts to find practical ways of harnessing the sun's energy. But the main reliance, certainly for the immediate future, will be on hydro and fuel.

**Coal, The Main Fuel . . .** It is likely that our liquid fuel economy will reserve more and more of our petroleum for transportation services because of its tremendous merit with the portable power plant. The stationary plant will have to rely increasingly on coal. This translates rigorously, in today's thinking, as steam power. While there are encouraging signs that there are other mechanisms on the way for converting the heat energy of coal into electric energy, steam power appears to be the one reliable and economical system which will dominate the immediate future. The practical alternative which is accordingly offered for the ways of meeting the anticipated loads of Fig 3 is therefore between steam and hydro.

An attempt has been made to translate the expected loads into fuel and water requirements. The data of Tables IV and V are the consequence of this attempt. In allocating future generation between hydro and steam it must be recognized that firm, prime, and peak capacities confuse the issue. In a similar way it must be evident that the more advantageous hydro sites have already been harnessed. Each time that another site is developed what remains is less attractive than what was available before. And in turn, much of the potential hydro capactiy is not properly located with reference to the market; e.g., some 40% of the nation's potential hydro is located in the Pacific Northwest.

**How Much Hydro? . . .** Of the many efforts which have been made to estimate the aggregate potential hydro capacity of the country, the most recent and most reliable is that of the Federal Power Commission which places the figure at 106,500,000 kw and a production of 487 billion kwhr in an average water year. The existing water power development is 18,700,000 kw with an average annual output of 97 billion kwhr. The hydro capacity of the country is thus developed to 17.5% of the power potential and 20% of the energy potential.

**Table II—Building Volume and Floor Space Requirements Of Representative Steam Electric Generating Plants 1900—1950**

| Plant | Year | Plant Size Kw | Building Volume cu ft per kw | Floor Space sq ft per kw |
|---|---|---|---|---|
| 74th Street IRT Reciprocating engine plant | 1903 | 45,000 | 180 | 2.0 |
| Good steam turbine plant, World War I | 1918 | 100,000 | 40 | 0.35 |
| Good steam turbine plant, post World War I | 1925 | 150,000 | 35 | 0.25 |
| Good steam turbine plant, World War II | 1945 | 200,000 | 30 | 0.22 |
| Good steam turbine plant, post World War II | 1950 | 300,000 | 25 | 0.20 |

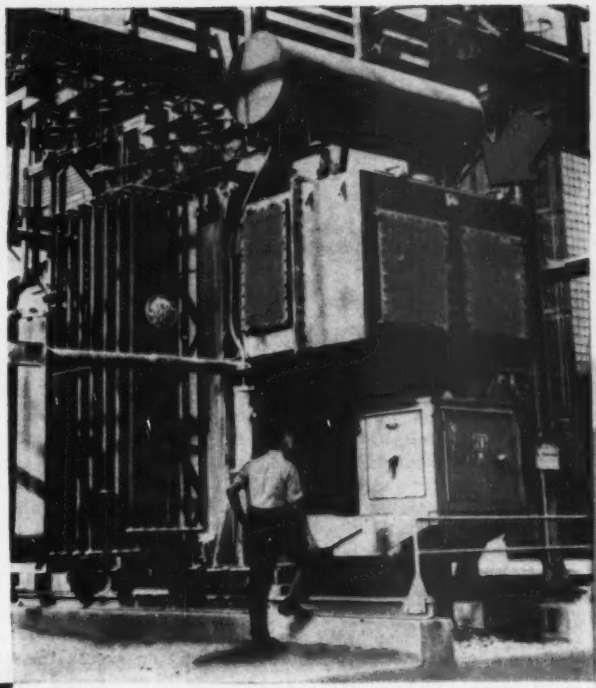
**Table III—Labor Requirements of Representative Steam Electric Generating Plants 1900—1950**

| Plant | Year | Plant Size-kw | Kw capacity per employee |
|---|---|---|---|
| 74th Street IRE Reciprocating engine plant | 1903 | 45,000 | 90 |
| Good steam turbine plant, World War I | 1918 | 100,000 | 400 |
| Good steam turbine plant, post World War I | 1925 | 150,000 | 600 |
| Good steam turbine plant, World War II | 1945 | 200,000 | 1400 |
| Good steam turbine plant, post World War II | 1950 | 300,000 | 2500 |

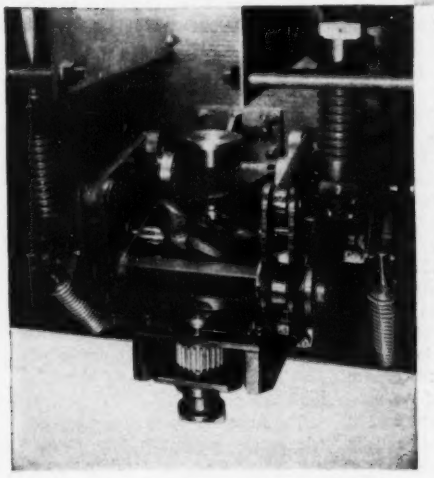
Note: Labor adjusted to 40 hour week

# No appreciable mechanical wear after 1,017,706 tap changes

## G-E load-ratio-control averages 800 tap changes a day at Alcoa plant



G-E LOAD-RATIO-CONTROL TRANSFORMER rated 40,000 kva (output) 13.8 kv, installed at Alcoa's Vancouver plant, provides ±5% voltage regulation.



MILLIONS OF TROUBLE-FREE OPERATIONS are built into this hardened steel cam assembly—typical of the mechanical strength of G-E load-ratio-control. Each new LRC design must pass mechanical-life tests of several million operations before it can be approved for production.

The load-ratio-control equipment on this transformer really has to "take it." Installed on January 16, 1946, it has already completed more than a million tap changes under load! At its last inspection on January 17, 1951, Alcoa found the LRC mechanism in excellent working order. None of the mechanical parts—bearings, pins, cam rollers or cam surfaces—showed appreciable wear.

Without a rugged mechanical system, the toughest electrical parts would be worthless. That's why every new LRC design must pass mechanical-life tests equal to at least 30 or 40 years of ordinary service!

**Requires less routine maintenance, too!**

With G-E load-ratio-control, you don't do any *unnecessary* service work. The instruction book which accompanies each unit tells how many operations you can expect the LRC equipment to perform before you have to replace contact tips and clean insulation.

This means you can eliminate unnecessary inspections. Simply refer to the instruction book and read the operations counter to schedule maintenance only when it is needed!

Over 39,000,000 installed kva have proved that General Electric LRC is as reliable as the core and coils themselves.

*General Electric Company, Schenectady 5, New York.*

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GENERAL ELECTRIC

**Table IV—Required Thermal Plant Production in 1970**

| Annual Growth % | Total Required Electric Output Kwhr (billion) | Output in kwhr required from fuel if hydro capacity is developed | | | | Percentage annual output from fuel if hydro capacity is developed | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 100% | 67% | 50% | 33% | 100% | 67% | 50% | 33% |
| 3 | 600 | ..... | ..... | 357 | 438 | ..... | ..... | 60 | 73 |
| 4 | 720 | ..... | ..... | 477 | 558 | ..... | ..... | 66 | 78 |
| 5 | 880 | ..... | 556 | 637 | 718 | ..... | 63 | 72 | 82 |
| 6 | 1050 | 563 | 786 | 807 | 888 | 54 | 69 | 77 | 85 |
| 7 | 1250 | 763 | 986 | 1067 | 1088 | 61 | 74 | 81 | 87 |
| 8 | 1530 | 1043 | 1906 | 1287 | 1368 | 68 | 79 | 84 | 89 |

Note: These data are combined with estimated total energy requirements for the year 1970 from Fig 3

When such figures as these for the hydroelectric capacity of the nation are combined with the anticipated load growth data of Fig 3, some interesting results are obtained. In Table IV an attempt has been made to set up the figures for water and fuel generated electric energy for the year 1970. Various percentages of hydro development have been postulated and deducted from the expected total requirements in order to estimate the contribution which must come from fuel.

The location of many hydro sites, far removed from markets, makes much of the potential capacity fictional. If the 6% growth rate (1,000 billion kwhr by 1970) is taken as representative, the data of the table demonstrate the utter inadequacy of water power to meet our demands for electric energy. If one third of the nation's hydro potential is developed, then nearly seven eighths of the total energy requirements must come from some other source—probably fuel.

Increasing inadequacy of water power for future needs is already recognized in many parts of the country. There are utility systems which started out exclusively as hydro only a few decades ago and which today have become predominently steam. The Tennessee Valley Authority, which was the prime example of a hydro system, burned 900,000 tons of coal in 1950 but is expected to burn 13,000,000 tons in 1956—an increase of nearly 1,500% in coal consumption in a period of six years. This is not exceptional as there are many other examples which might be cited similarly to demonstrate the increasing importance of steam power and the lessening importance of hydro power.

**Future Fuel Needs . . .** In an effort to translate the data of Table IV into an estimate of the fuel requirement for the electric utilities by 1970, Table V has been prepared. The procedure used in the development of this table has been to apply the following basic estimates:

1. 75% of the annual generation will originate in fuel.
2. 80% of the fuel-generated energy will originate, in turn, in coal.
3. The annual average plant heat rate by the year 1970 should be reduced to a value of 10,000 Btu per kwhr.
4. The average heating value of coal burned should be 12,500 Btu per lb ($25 \times 10^6$ Btu per ton).

Results of the application of these figures to the anticipated load growths of 3% to 8% are shown in the last column of Table V. For the growth rates previously emphasized the utilities are estimated to need between 200 and 300 million tons of coal annually by 1970. Last year the utilities used somewhat more than 100 million tons. The entire bituminous coal demand of the nation for 1952 is estimated as 560 million tons.

Comparison of the expected consumption of 200 to 300 million tons by 1970 with this figure of 560 million tons poses many serious problems for our industrial economy. These data make no allowances for the growth in industrial demands, in heating demands, and in the possible conversion of coal to liquid fuel forms in order to buttress our petroleum reserves. How will the coal be found, mined, and delivered to meet these many demands? And specifically what is the future problem of supplying coal in reliable amounts to meet the onrushing demands of the steam electric power industry alone?

One further observation can be made from these estimates on fuel. For every kilowatthour generated in a steam plant today, at a heat rate of 15,100 Btu, there are required approximately 750 lb of water in the condenser circulatory system. By the year 1970 the anticipated fuel consumption of 300 million tons will call for an average water supply requirement of the order of 200,000 cu ft/sec. With a 50% load factor the peak flow rate would run to 400,000 cu ft/sec.

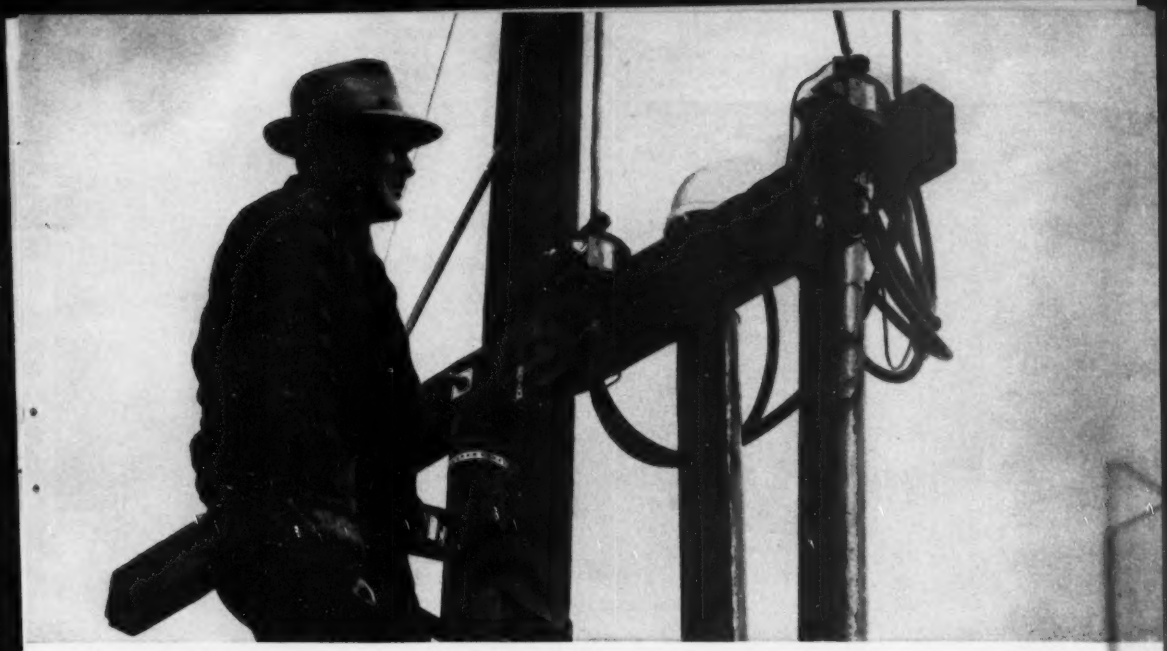
If this were potable water it would be sufficient to sustain a population of billions of people. This condensing water requirement, while large in magnitude, is alleviated by tide water operations, by reuse of the water in flowing streams after sufficient evaporative cooling, and by reclamation systems such as cooling towers and spray ponds.

The non-uniform distribution of water resources also poses a question here for the steam plant as it did above for the hydro plant.

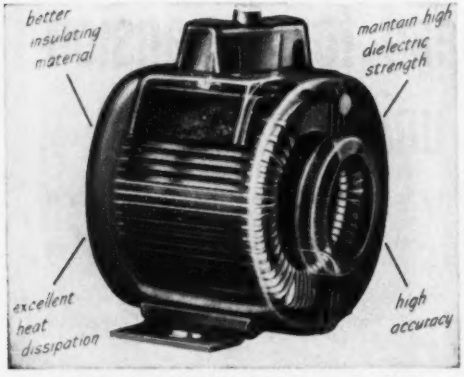
The future of steam power for electric energy generation thus presents our industrial economy with many new problems. If we are to meet the demands for electric power, the burden will in all likelihood be borne in the next few decades by steam. That burden is, in turn, promptly shifted to the people and the industries concerned with providing the fuel and the water. What steps can and should be taken to meet the impact of the relentless pressure of our steam power plants on the nation's coal and water resources?

**Table V—Fuel (Coal) Requirements of Electric Utilities in 1970**

| Annual Growth Rate % | Total Electric Output Kwhr (billion) | Electric Output Generated by Fuel Kwhr (billion) | Total Fuel Required—Equivalent Coal tons (million) | Estimated Coal Required tons (million) |
|---|---|---|---|---|
| 3 | 600 | 450 | 180 | 144 |
| 4 | 720 | 540 | 216 | 173 |
| 5 | 880 | 660 | 264 | 212 |
| 6 | 1050 | 790 | 316 | 253 |
| 7 | 1270 | 950 | 380 | 304 |
| 8 | 1530 | 1150 | 460 | 368 |



# Pacific Gas & Electric Company Benefits from Easy Installation of G-E Current Transformer




**INSULATION, SUPPORT, AND CASING** are of molded butyl. Laboratory and service tests have proved butyl resists weather.

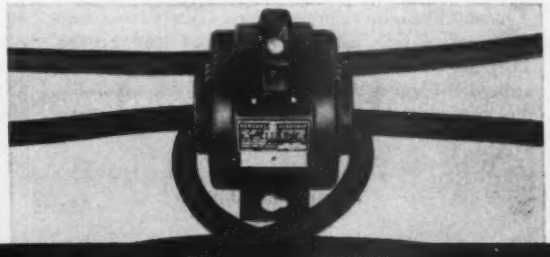
## Less Breakage with Butyl-molded Indoor-Outdoor Current Transformer

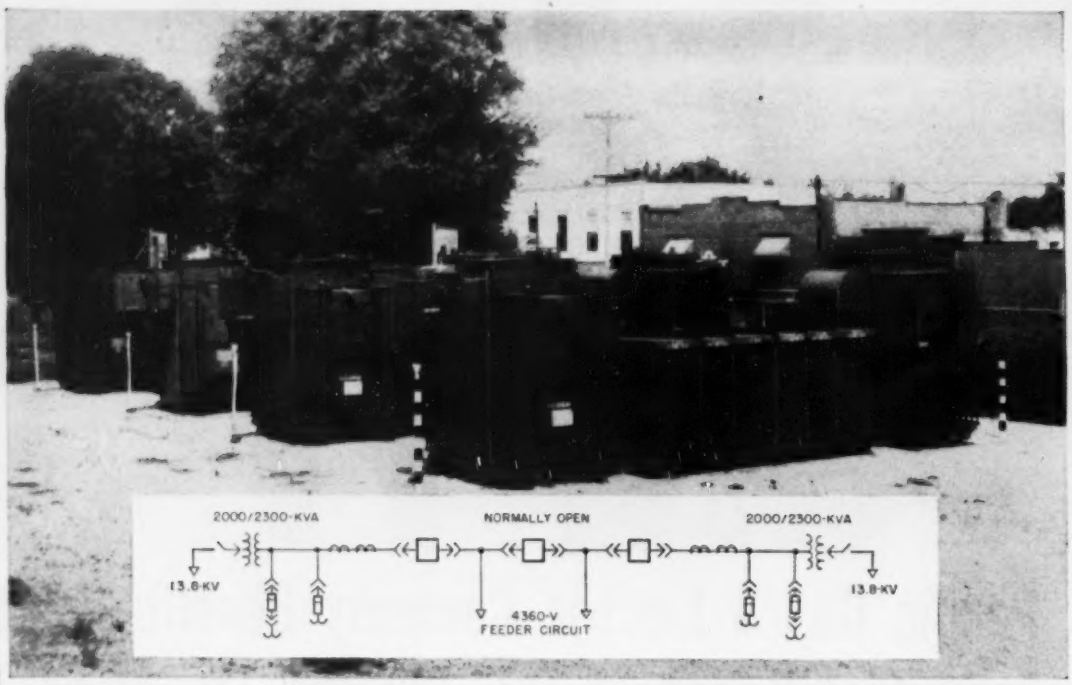
Pacific Gas & Electric Company is currently using the new Type JKP-O butyl-molded indoor-outdoor current transformer extensively for metering 480-volt irrigation pumping loads. The JKP-O greatly simplifies such installations because the transformer design permits the use of continuous leads between mains and weather-heads. The butyl construction also practically eliminates the breakage hazard during installation. For more information contact your local G-E representative or write Section 604-34 for Bulletin GED-1465, General Electric, Schenectady 5, N. Y.

GENERAL ELECTRIC

**SECONDARY TERMINAL COVER** cannot be put in place unless short-circuit switch is properly positioned. This feature protects both personnel and equipment.

**WHEN USED AS THREE-WIRE TRANSFORMER,** two conductors are passed through the window. The two-inch window allows easy insertion of full-sized primary cables.






**"BLOCK BUILDING"** in Kansas City. Substation 45 points up "building block" method. Two G-E 4000/4600-kva master unit substations were installed in 1947, two more in 1949. One-line diagram (inset) shows type of standardized duplex station used.

# Missouri utility plans ahead for expansion using standardized G-E unit substations

## Kansas City Power & Light gains system flexibility with "building block" approach

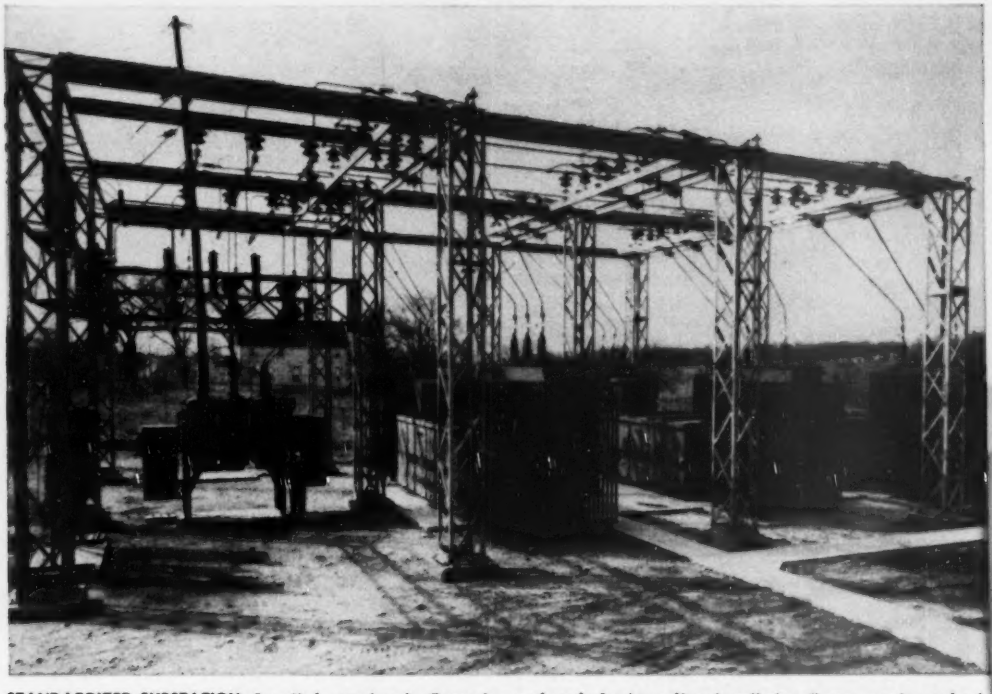
With 22 G-E standardized master unit substations installed over a five-year period, Kansas City Power & Light Co., Kansas City, Mo., knows the value of advanced planning—using duplicate units as "building blocks" in its system.

This "building block" method—which permits adding or removing capacity in easily handled, relatively small "blocks of power"—has enabled the Missouri utility to expand its system simply and economically. Engineers early decided upon the unit substation which best suited their purposes—in this instance, a G-E 4600-kva duplex unit.

In addition, utility engineers have achieved maximum flexibility to take care of unexpected load growth. They can meet load shifts simply by shifting the standardized G-E units. If the load should change radically, they can move quickly to other types of standardized G-E unit substations, still employing the "building block" approach.

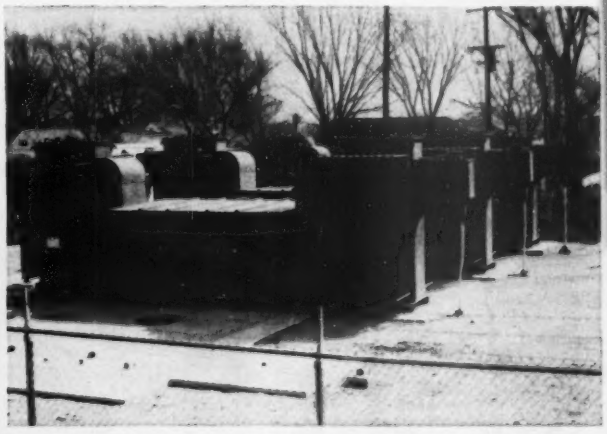
Your needs most likely parallel those of the Kansas City utility, and you, too, will find that advanced planning with the "building block" method keeps system investment as low as possible in relation to actual load. Small "blocks of power," with their flexibility and economy, give insurance against excessive investment in unused capacity.

At the same time, G-E factory-assembled master unit substations simplify planning and purchasing—save time in delivery and installation. And with G-E equipment, you are assured of dependable, first-quality components made possible by repetitive manufacturing methods. For full information, write for Bulletins GEA-3800 and GEA-4500. *General Electric Company, Schenectady 5, New York.* 321-100



**STANDARDIZED SUBSTATION.** Supplied complete by General Electric, 3 units and steel structure of Substation 30 were delivered ready for immediate installation. Factory-engineered substations simplify purchasing, save valuable engineering time.

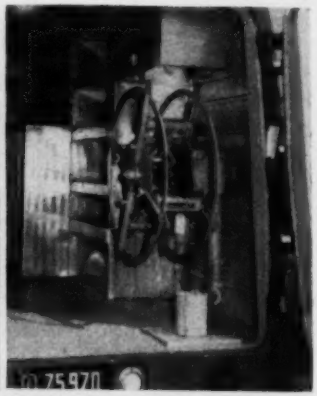
**CONCEALED BY TREES.** This one-unit substation in residential area shows how proper planting can effectively camouflage installations.



**READY FOR NEXT UNIT.** Kansas City's Substation 84 has three duplex units already installed. Foundation, in foreground, is set for fourth unit, if required for increased load.

GENERAL ELECTRIC

NEAT AND COMPACT is overhead service truck used by Los Angeles Dept of Water and Power. Ladder and crossarms are carried on top of truck



ADJUSTABLE PAY-OUT REEL swings out over end of truck to provide flexibility in stringing

## Install Services from Neat, Compact Truck

Equipment for installing residential services is carried neatly and efficiently in a compact overhead service truck on the Los Angeles Department of Water and Power system. Design highlights feature the use of aluminum to reduce weight and two wire pay-out reels at the rear of the truck which swing out for maximum flexibility during stringing.

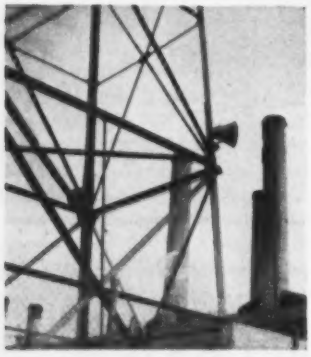
The truck is a 10,000-lb gross vehicle weight, dual rear wheel, van type. Inside facilities are made of aluminum cut and fabricated in the department's shop. They include two felt-lined bins for carrying up to 38 meters, a storage bin for rope, blocks, and hooks, and a cabinet for tools and line hardware. Under this cabinet is a partitioned storage space for five coils of wire. The top of this storage space forms a work bench in front of tool compartment. At the rear of the truck and above each pay-out reel is a shelf for additional storage. One of these shelves is closed by a door and latch.

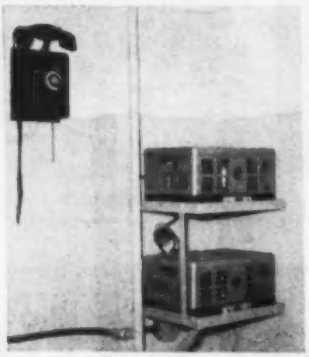
Adjustable pay-out reels are mounted on L-shaped, reinforced pipe mounts. The mount swings out over the end of the chassis and the reel shaft is attached so that it turns on the mount in a full circle.

Two bus-type seats, a jump seat between them and a folding bucket-type seat allow for comfortable seating of five men in addition to the driver. A small folding table of ¾-in. plywood near the front is provided for necessary paper work.

A rack on the side of the truck carries two 9-ft ladders. On top of the truck are mounted a box for two more ladders and a rack for crossarms. Provision has also been made to carry a service ladder on the rear. The Department has eight of these units in operation.

## Plant PAX Uses Code-Call System to Contact Plant Personnel





LOUDSPEAKERS outside and inside the plant work in pairs, carry the coded signal. Two amplifiers drive about 20 speakers, cover one plant area. Key personnel answer calls by phone.

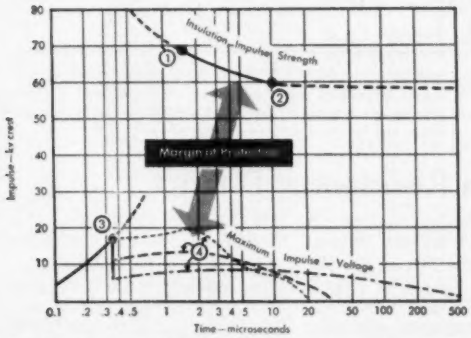
**KENNETH E. DUEKER,** Communication Division, Southern California Edison Co, Alhambra, Calif.

To contact key personnel conveniently and quickly by telephone, Southern California Edison has integrated a code-call system into its private automatic telephone exchange in a major generating station. When a man is paged, his code is sounded over loudspeakers continuously until he answers over the nearest telephone or the caller hangs up his phone.

In normal use only two digits are used to dial another phone in the plant. To use the code-call system, a four-digit combination is used. Numeral 70 is dialed to set up the coding

**G-E PELLET ARRESTERS** are also unequalled in durability—they're the only distribution arresters with series gaps sealed in dry, inert nitrogen. Gap electrodes stay bright as new. The Pellets, themselves, are unaffected by service moisture.

# No other distribution arrester protects so well




**THIS GRAPH** was made from actual volt-time and ampere-time oscillograms, and from AIEE standard test data. The demonstrated impulse strength of 2400-volt distribution transformer insulation is represented by the curve passing through: (1) the minimum impulse strength on an AIEE standard chopped wave test, and (2) the minimum impulse strength on an AIEE standard full-wave test. The impulse voltage allowed by a 3-kv General Electric Pellet Arrester is determined by (3) the impulse sparkover voltage of the arrester on the AIEE standard test wave, and (4) the IR drop across the arrester to ground with (top line) a 65,000 ampere discharge—(middle line) a 20,000 ampere discharge—and (bottom line) a 1500 ampere long duration discharge. The arrows show the unequalled margin of safety.

***HERE'S THE EVIDENCE.*** The graph at the left, from actual volt-time and ampere-time oscillograms, shows the unequalled margin of safety that a 3-kv General Electric Pellet arrester gives a 2400-volt distribution transformer. Higher rated arresters, protecting higher-voltage transformers, similarly show this unequalled margin of protection.

***HERE'S THE REASON.*** This extra protection results from a combination of low sparkover voltage and exceptionally low IR drop. Whether lightning currents are high or low, with durations long or short, no other distribution arrester holds voltages to such low levels.

***HERE'S YOUR CUE.*** The Pellet is a valve-type arrester for universal use on urban, rural, or industrial systems. It is available in ratings of 1 kv to 15 kv inclusive. This arrester has been the quality-standard for over 25 years—it's your cue for maximum protection. For further information contact your G-E representative or your authorized G-E agent. *General Electric Company, Schenectady 5, N. Y.*

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**GENERAL ELECTRIC**

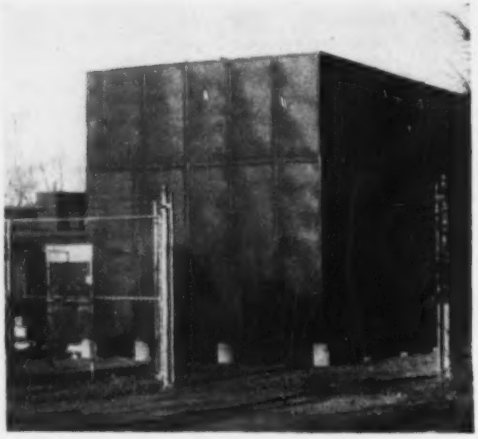
equipment; then the code-call numerals, which are two-digit combinations, are dialed. If 27 is the code numeral dialed, coding equipment emits a signal corresponding to these numerals over the loudspeakers. The signal consists of a cycle of two impulses, a pause, seven impulses and a pause.

If the party being called is in the plant, he goes to the nearest phone and dials 79. This stops the code equipment and connects him to the caller. To release the coding equipment for use by others before the conversation is ended, the called party has to hang up and dial the original caller.

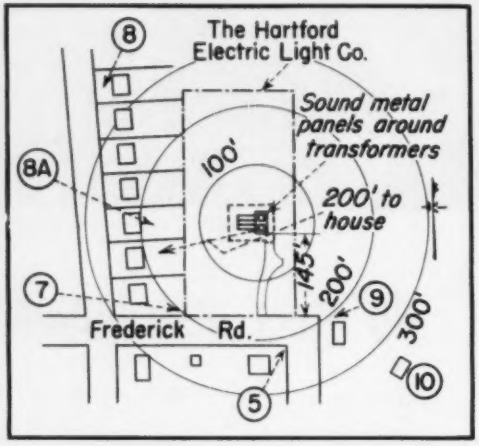
An improvement over the original system has been the replacement of horns and bells in the plant and outdoors with re-entrant horn-type loudspeakers. Maintenance of the 120-v battery power supply and the 48-v control supply for the horns and bells was one of the reasons why groups of speakers each driven by two 60-w audio amplifiers were chosen.

About ten speakers are connected to each amplifier. To use much of the existing wiring from the old system and to keep length of lines to speakers at a minimum, amplifiers are located in the areas they serve. In addition, by serving every other speaker in a given area from one amplifier, satisfactory and reliable coverage is maintained even though one amplifier fails or is out for maintenance.

Power amplifiers are driven by a tone generator which consists of two phase-shift oscillators. Their individual output of 700 cycles and 900 cycles are mixed to give a distinct and penetrating tone. Sound coverage from speakers emitting the same tone has been found to be superior to the combined result of horns and bells. Volume of speakers can be adjusted by an L-pad in the voice coil circuits.



OUTDOOR VIEW of 15,000-kva substation and switchgear metal-clad cubicles, which were treated with soundproofing panel. Transition section bolts and nuts were provided with rubber washers and cubicle interiors lined acoustically




SUBSTATION LOCATION PLAN showing distances to nearest residences. Numbered points indicate where sound level measurements were made. Acoustical panels cut transformer noise to negligible values and consumer complaints stopped

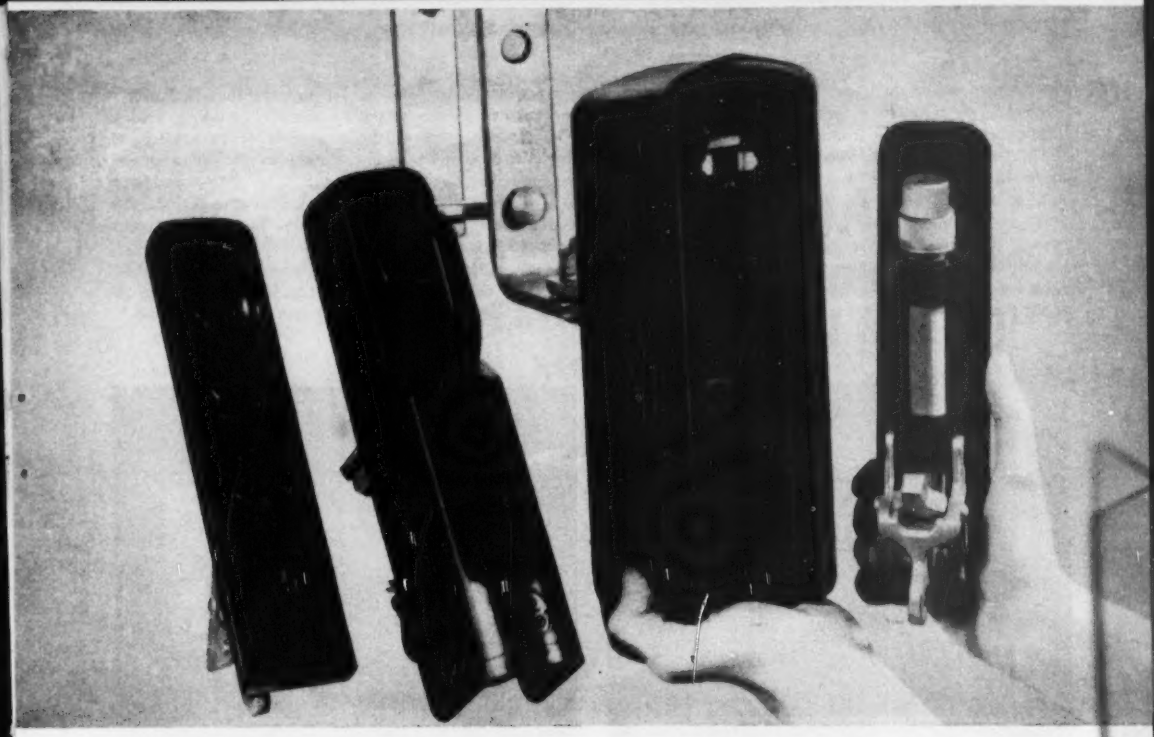
# Substation Noise Controlled in Residential District

Suppression of noise at the 15,000-kva, 22 to 4.8-kv Frederick Road substation of the Hartford Electric Light Co was effectively handled by use of 4-in. hollow sound metal panels filled with acoustical material. This is an outdoor installation in a residential district. It is located on a 390-ft x 200-ft lot, the nearest dwelling being about 200 ft distant. There are two transformers and outdoor metal-clad switchgear, installed in parallel settings about 16 ft apart. The transformers are mechanically connected to the switching equipment through sheet-metal transition compartments.

These transformers were first made alive at 2:25 p.m. on a Friday and were left energized without load until the following Monday morning. A complaint about noise was received that day from point 8-A on the plot and again 4 days later from point 9 on the plot. Three days later representatives of the utility, General Electric Co, and Industrial Sound Control, Inc, a Hartford firm of acoustical engineers, visited the substation. Sound metal panels were advised, with one face perforated and the back face solid.

A sound survey indicated an average neighborhood ambient noise level of 55.5 db on overall scale and an average of five stations selected as reading points from a high of 58 to a low of 53 DB. Analysis indicated that the noise peaked at 62 db between 75 and 150 cycles, and that the maximum intensity was within a 45-deg cone directly west of the cubicles.

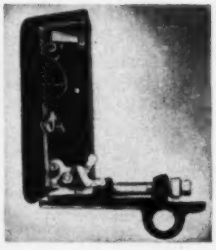
An inclosure of sound metal panels, 20 ft high and supported on concrete piers, was placed around the transformers. The piers were placed 18 in. above grade to allow air circulation. This panel inclosure led to some reduction in noise level, but not enough to be noticeable to the residents. A check survey showed narrow nodes of high intensity noise to the northeast and southwest, with narrow anti-nodes of almost zero noise to the northwest and southwest. Directly west was a large cone of considerable noise. The noise in the easterly direction was brought under control by filling the



# Four cutouts in one

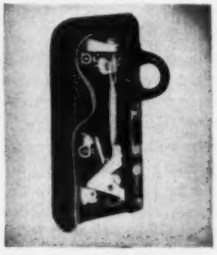
## by simply changing doors

Indicating



Drop-out

Reclosing



Disconnect

***A G-E FEATURE SINCE 1937!*** By stocking only three interchangeable doors which fit both 5.2- and 7.8-kv, 50-ampere housings, you get the 4 operating functions illustrated at the left. Available also in 100-ampere ratings, this unique flexibility reduces inventory and simplifies stocks.

***INDICATING OR DROPOUT WITH A TWIST OF THE WRIST!*** A small wire yoke, easily inserted or removed, determines whether the fuseholder door "kicks out" at the bottom for visual indication, or drops open—either way giving positive evidence of a blown fuse.

***RECLOSING DOOR AVOIDS UNNECESSARY SERVICE TRIP!*** The two-element reclosing door restores service within one second after a temporary fault blows the first fuse link. By saving a service trip, the two-shot cutout pays for itself the first time it operates!

***FLEXIBLE DISCONNECT BLADE CAN'T GET LOST!*** It's fastened to the door—can't be misplaced. This disconnect blade doubles the continuous current rating of the cutout. When the blade is disconnected and the door closed, the flexible cable extends downward to indicate that the circuit is open.

***WHAT'S MORE THE CUTOUT IS LIBERALLY DESIGNED***—has high dielectric strength, uses silver-plated contacts, provides full-range interruption of fault currents, and is conservatively rated. All live parts are completely enclosed for maximum safety.

For complete information contact your G-E Apparatus sales representative, or write for Bulletin GEA-3448. General Electric Company, Schenectady 5, N. Y.

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space under the original sound panel installation on the south and east with short panels down to the ground.

The transition sections were found to be in vibration and were transmitting this vibration to the first auxiliary section in the switchgear, causing this to vibrate outside the sound panel inclosure. It was felt this noise reflected from the solid surface of the panels toward Dorset Road (on the west). After some experimentation the transition compartments were treated as follows:

Rubber washers were placed under the heads and nuts of all bolts connecting the transition section to the switchgear; the inside of these transition cubicles was coated with an acoustical mastic compound and then lined with 2-in thick 2.5-lb density Fiberglass board, including floor and doors. To complete the installation a wall of sound metal panels was erected at the west end of the switchgear cubicles to a height of 16 ft and over the full width of the cubicle platform. A final survey showed a considerable reduction in noise frequencies between 75 and 4,800 cycles. A small shift in the 20 to 75-cycle band was noted. No further complaints have been received in relation to this substation.

WALL PANEL is hoisted into position after being poured and cured in a horizontal position. All columns were poured horizontally too

SERVICE BUILDING and warehouse provides for storing of all materials and supplies and dispatching of line trucks efficiently

# "Tilt-Up" Construction Cuts Building Costs 30%

**EARL N. HOLM** Valuation Engineer, Sacramento Municipal Utility District, Sacramento, Calif.

Reduction in building costs up to 30% and conservation of structural steel were two main reasons why Sacramento Municipal Utility District chose precast "tilt-up" concrete construction in building its new warehouse and service building. Although this type of construction is not new, the District's building represents the first complete precast job in northern California.

Precast tilt-up construction involves pouring concrete units flat on the ground with only simple edge forming and then hoisting them into the desired position. Other advantages of this method include elimination of contraction cracks; ability to use low slump concrete mix which may be vibrated to a hard, dense material; simultaneous work on various stages of the job to speed construction; a minimum of concrete finish work.

The building was designed to provide maximum efficiency for the warehousing of all materials and supplies and the dispatching of line trucks. It utilizes many features for demonstration and display of electrical facilities. It combines ground level area for truck parking and unloading with truck-high loading dock, warehouse, and office area. Roof beams over truck and dock area are cantilevered over the warehouse area to support the center beam, providing an 80-ft clear span.

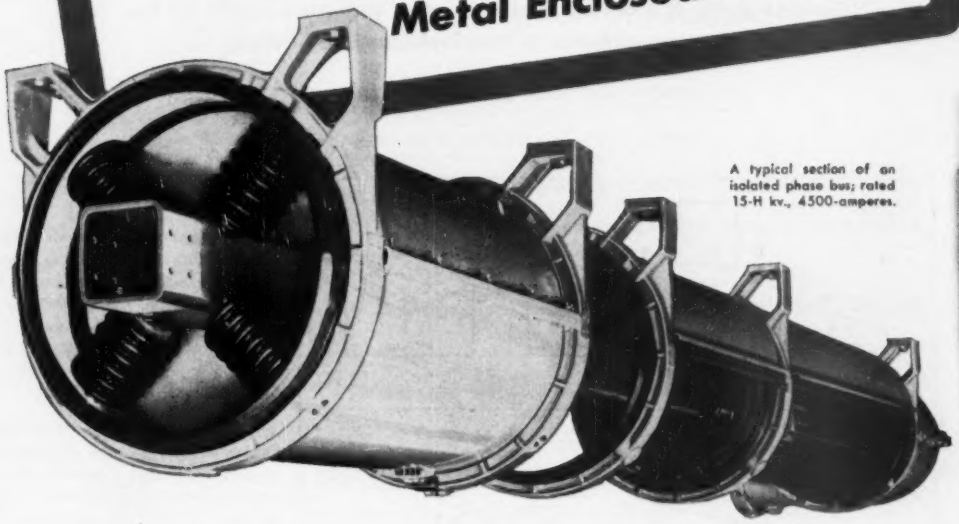
An old concrete floor at the site was used to precast the inner columns while footings were being excavated and poured. Simultaneously, dock panels were cast on sand or existing pavement with the inside face down or were pancaked. Dock panels were precast with reinforcing bars extending 4 ft above top and 12 x 12-in beam at the base.

After dock panels were placed and braced from the outside, entire area was sand filled and the floor poured, inner columns extending through the floor. Within a week after the floor was poured, front and rear columns and all panels were poured. While these were curing, truck floor was poured and spandrel panels precast on this area. Erection of panels followed about a week after pouring, five days being the minimum. As panels were set in place, weld clips cast into both column and panel were welded and the V-joint dry-packed. Weld clip pockets were then filled with dry-pack. Strength of this joint is in the dry-pack after hardening rather than the weld clips.

Power supply to the building consists of an underground, 3-phase, 4,000-v primary circuit to a transformer vault. Distribution is a 4-wire star, 120/208-v to four distribution panelboards in addition to some circuits direct from the main panelboard. A small delta bank supplies 4-wire, 120/240-v to the meter test shop. Use of 4-wire star distribution saved estimated 50% conduit, 30% copper.

Total load is approximately 220 kva consisting of heaters in the washroom, three heat pumps, radiant heating along the outside wall in purchasing offices, and fluorescent lighting throughout. Lobby features latest luminous ceiling.

# A DIRECT PATH TO BETTER PROTECTION with DELTA-STAR Isolated Phase Metal Enclosed Bus Runs



A typical section of an isolated phase bus; rated 15-H kv., 4500-amperes.

**DELTA-STAR METAL ENCLOSED BUSES ARE AVAILABLE FOR ALL REQUIREMENTS**

"Unit-type" metal-enclosed bus designs are available in a wide variety for isolated phase, segregated phase and non-segregated phase construction. Delta-Star's experienced engineers will make an analysis of your proposed installation and determine which type will be the most economical for your service requirements. Regardless of the type selected, you are assured of a design which will fit into your installation at lowest possible erection cost.

For complete information ask for Publication 5006.

Here is the safest direct path between generator and station bus or transformer. Absolute isolation of each phase eliminates the possibility of a phase to phase fault.

**Phases individually isolated and enclosed.** Bus is supported within heat treated cast aluminum rings by porcelain insulators which are always placed in compression both under normal load and in event of short circuit.

**Aluminum Covers in identical halves** with silvered channel shape edges provide strong sections for bolting and good electrical contact between halves. Specially shaped neoprene gaskets eliminate dust and moisture. Large area ring gaskets permit liberal misalignment of ducts without reducing seal. Covers easily removed for inspection.

**Easy to Erect — Simple to Install.** Every structure is custom built to meet specific requirements, factory engineered, factory assembled and factory tested before shipment thus reducing installation cost to a minimum.

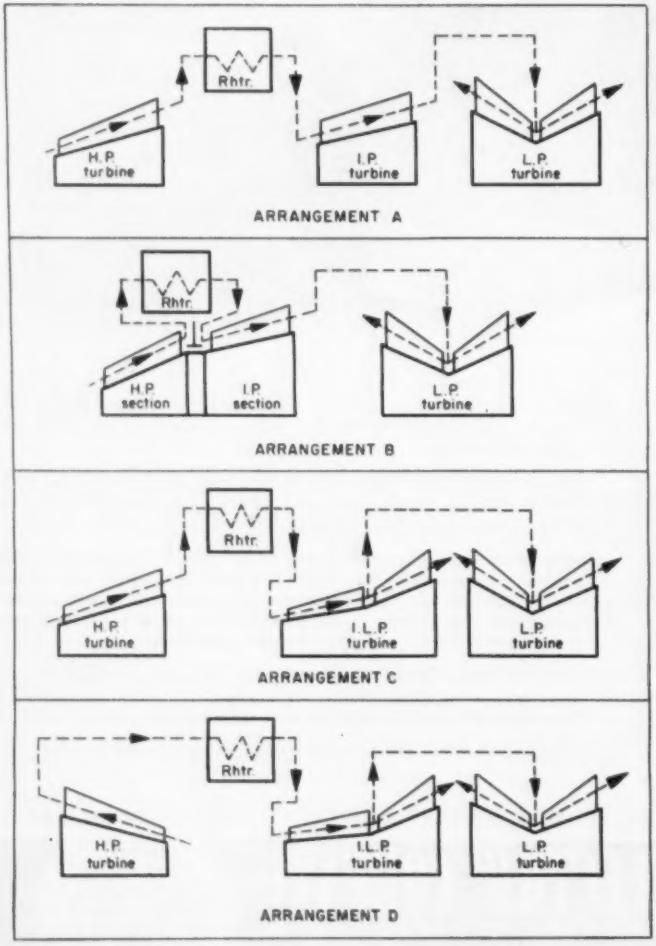
**FOR COMPLETE DETAILS** write or call our nearest district representative or our main office.

WHEN YOU WANT THE BEST IN HIGH VOLTAGE EQUIPMENT, SPECIFY DELTA-STAR

**DELTA-STAR ELECTRIC COMPANY**
DIVISION OF H. K. PORTER COMPANY, INC.
2437 Fulton Street • Chicago 12, Illinois
DISTRICT OFFICES IN PRINCIPAL CITIES

# Steam Paths in Reheat-Cycle Turbines

**Diagrams show steam path through tandem-compound turbines using reheat steam and driving single 3600-rpm generators usually 60 Mw and larger; these arrangements by Westinghouse Electric Corp**




**Arrangement A . . .** A three-cylinder turbine with steam passing through a separate high-pressure element, into a reheater before passing through the separate intermediate-pressure element, and dividing through the separate double-flow low-pressure element to flow in opposed directions.

**Arrangement B . . .** A two-cylinder turbine where high- and intermediate-pressure elements are combined into a single cylinder. Steam flows in same direction in both elements because of a separating seal across which pressure differential is quite small, being the same as the pressure drop through the reheater and its piping. Steam divides in the low-pressure unit.

**Arrangement C . . .** A three-cylinder turbine consisting of a high-pressure element, a combined intermediate-low pressure element and a low-pressure element, with steam being reheated between the high- and intermediate-pressure elements. This arrangement is used on larger 3600-rpm units, where a third low-pressure blade section is required.

**Arrangement D . . .** A three-cylinder turbine similar to arrangement C except that the high-pressure element is turned in the opposite direction, thus opposing the blade thrust loads in the high and intermediate pressure elements. This construction reduces size of balancing pistons, simplifies casing construction, and results in slight improvement in turbine efficiency.

Adapted from a paper (51-A-68) entitled "Present Development of the Reheat Steam Turbine" by R. L. Reynolds, Westinghouse Electric Corp, South Philadelphia Works, before American Society of Mechanical Engineers, 1951 Annual Meeting, Atlantic City, N. J.

No. 6 IN A SERIES

A DISTRIBUTION ENGINEER ASKS—

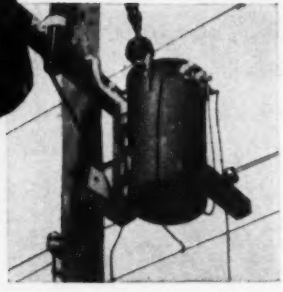
## "How can we reduce transformer bushing flashover caused by air-borne contamination?"

*It can be done quickly, easily and economically simply by installing Pinco L5206 Fog Caps.*

## here's the answer:

As a matter of record, these Fog Caps have been in use on installations in coastal areas for several years and are now finding popular acceptance wherever "fog" conditions exist—particularly in those areas where air-borne industrial and chemical wastes are a constant source of trouble to transformer efficiency.

So if you are confronted with a similar problem, then the Pinco L5206 Fog Cap is the "idea" that will help you to eliminate costly and annoying "outages." Available in various sizes to meet your requirements. Drop us a line . . . we'll be glad to give you complete details.



### FEATURES OF THE PINCO L5206 FOG CAP

1 PROTECTS upper part of bushing from contamination; also keeps it dry, thereby maintaining an effective leakage path.

2 ELIMINATES annoying service interruptions caused by bushing "flashover."

3 EASY TO INSTALL on present equipment. Just remove bushing terminal and place PINCO L5206 Fog Cap in position and replace terminal. Cap is equipped with coreprene gasket.

**The Porcelain Insulator Corporation**
LIMA, NEW YORK

*Sales Agents: Joslyn Mfg. & Supply Co.*
*Offices in Principal Cities*

# Design Nozzle for Use in Insulator Washing

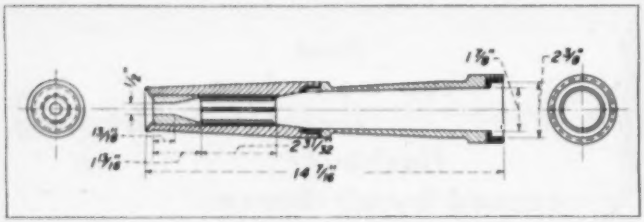



FIG 1—ORIGINAL NOZZLE DESIGN. Ratio of length of straight bore to diameter of nozzle orifice (L:D) is 1.5: 1 or less, actually 13/16: ½ or 0.812: 0.5

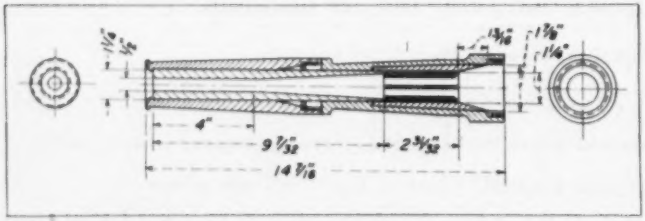



FIG 2—IMPROVED NOZZLE DESIGN. Ratio L:D is 2.5:1 or greater, actually 4:½ or 4:0.5. Gradual tapered slope is used between straightening vanes and nozzle tip

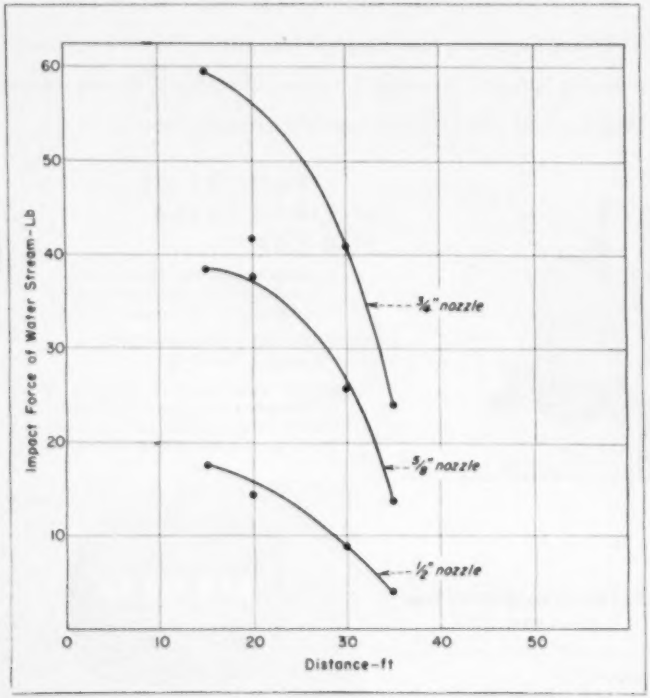



FIG 3—IMPACT FORCES on a 3-in. circular disk obtained from water streams from nozzle of Fig 2 at a nozzle pressure of 125 psi

A nozzle has been designed and constructed to provide the most solid water stream for the greatest distance for washing insulators. Its primary use was to investigate the feasibility of washing energized line insulators at low pressures of 100 to 200 psi.

A nozzle designed in the early stages of the experiment is shown in Fig 1. Ratio L:D, that is, length of the straight bore section to the diameter of the nozzle orifice is 1.5:1 or less.

A nozzle designed in the later stages of the experiment is shown in Fig 2. It differs from the earlier design in that the ratio L:D is of the order of 2.5:1 or greater. Also a gradual tapered slope was introduced between the straightening vanes and the nozzle tip.

Tests of the two nozzles showed that the water streams obtained from the nozzle of Fig 2 are more solid and compact than those obtained from the nozzle of Fig 1.

Photographs were taken of the water streams from both nozzles and the following observations were indicated:

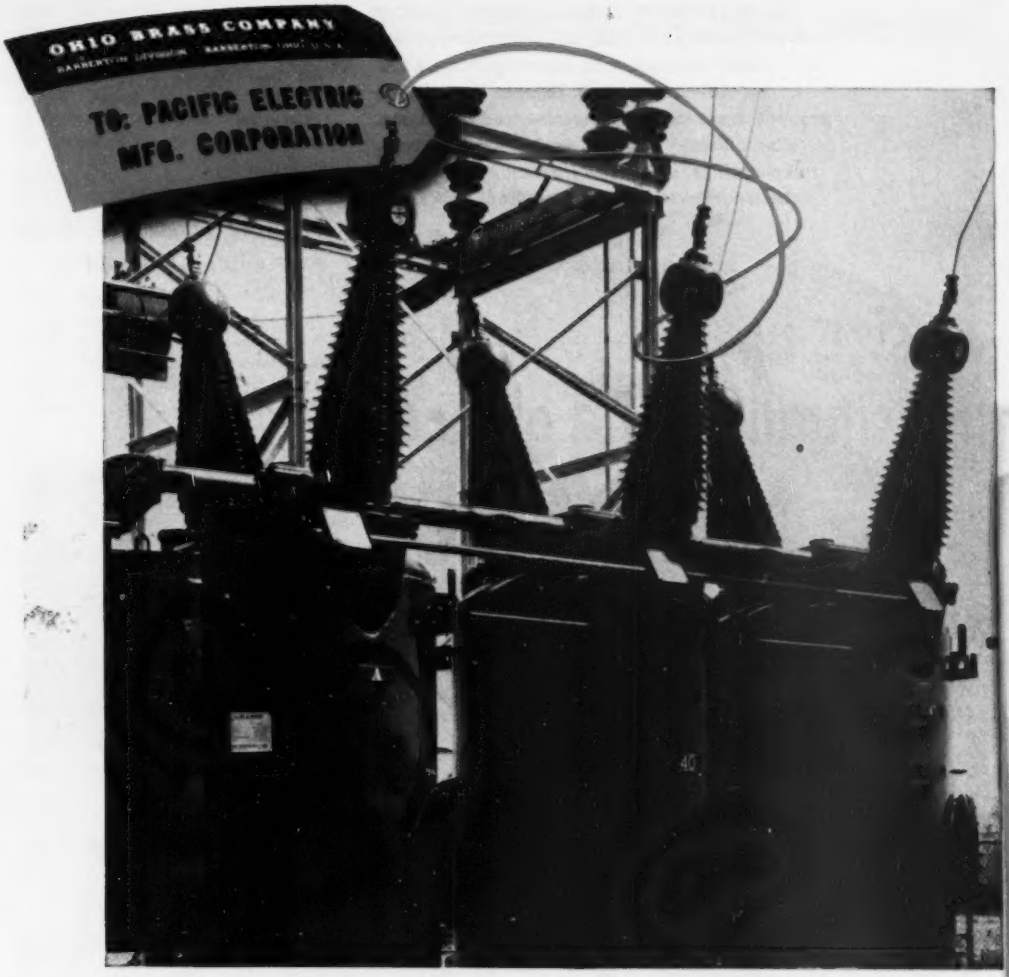
**1.** Ratio of the length of the straight bore section of the nozzle tip to the orifice diameter mainly determines the pressure at which the stream of water tends to break up.

In the tests of the first nozzle (Fig 1) with the smaller ratio a definite limiting pressure was encountered beyond which the water stream from the nozzle would totally break up. However, in tests with the second nozzle (Fig 2) with the larger ratio a pressure limit was not reached within the working pressures of the experiment.

**2.** Solidity or compactness of the water stream at each nozzle pressure depends not only on the ratio of the length of the straight bore section of the orifice diameter but also on the straightness of the stream before it enters the nozzle tip.

To assist in analyzing the solidity and compactness of the water streams, as well as to obtain the value of impact in the insulator washing, dynamometer tests were made. The impact

Adapted from a conference paper "Live-Line Insulator Washing with a Low-pressure Water Stream" by Irvin F. Freed presented at AIEE Middle Eastern District Meeting, Baltimore, Maryland




One of several 5-cycle high-speed reclosing 138-kv oil circuit breakers supplied to a leading Midwest utility by the Pacific Electric Mfg. Corporation. According to its builder..."the entrance bushings of these circuit breakers are subjected to minimum mechanical impact at closing because the stationary contact structures are of the nested sliding-shoe (finger) type. In the closed position the bushings are not subjected to the forces of kick-off or bumper springs because all operating forces are applied external to the tanks. Other Pacific features include maximum simplicity of interrupter design, only one moving part in each tank," . . . And

# O-B BUSHINGS

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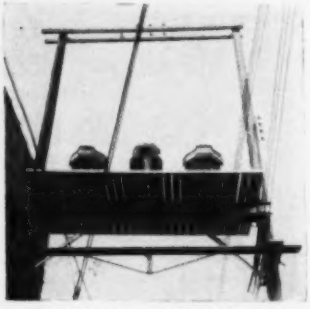
forces of various streams of water against a 3-in. circular target were measured for various pressures, orifice diameters, and distances between the nozzle and the target. Fig 3 shows the impact values obtained from the water streams of the nozzle of Fig 2.

## Portable Trussed Platform Aids Alley Construction

Trussed planks have made work more safe and efficient on distribution structures that span alleys. Plank ends are supported by painters' ladder brackets or hooks, or by standard 30-72 in. cantilever-type lineman's

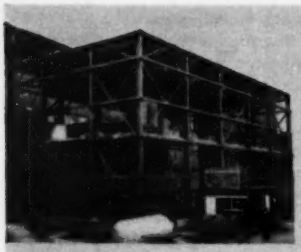
**CANTILEVER SUPPORT** is customary lineman's platform



**PORTABLE TRUSSED PLATFORM** supported on cantilever supports

platforms attached to the poles, as illustrated. The 2 in x 12 in x 18 ft fir plank with truss weighs 122 lbs. Each completed plank cost approximately $10, exclusive of end supports which are standard truck equipment.

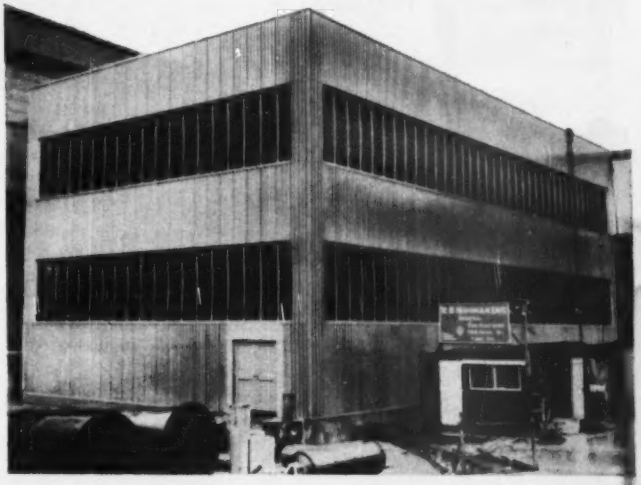
Formerly it was necessary to set up ladders or lie prone on platforms to bolt down the transformer platform. Moreover, it was difficult and somewhat hazardous to make taps on buses



This addition to steam generating facilities at Olmsted Air Force Base, Middletown, Pa., is sided with panels of U·S·S 17 Stainless Steel. The building is shown above before installation of panels and at the right as it nears completion. Architect-Engineer: Gannett, Fleming, Corddry & Carpenter, Inc., Harrisburg, Pa. General contractor: R. S. Noonan, Inc., York, Pa. Stainless Steel panels fabricated and erected by H. H. Robertson Co., Pittsburgh, Pennsylvania.

# Using lightweight, long-lasting, insulated building panels

## Complete walls of U·S·S 17 *(Type 430)* Stainless Steel installed in 11 working days



MORE than 7,000 square feet of U·S·S 17 Stainless Steel insulated panels form the complete walls of this new building which is an addition to existing steam generating facilities at the jet engine overhaul line at Olmsted Air Force Base, Middletown, Pa.

These Stainless Steel panels were installed by a crew of eight men in only 11 working days. One group of four men removed the protective paper and drilled the panels, and a second group of four men removed the girts and bolted the panels into place.

Quick installation like this—*in any weather*—means much lower labor costs. And that's but a part of the dollars-and-cents advantage of using Stainless Steel panel construction.

In the long run, the durability and corrosion resistance of Stainless Steel walls, the light weight in comparison to conventional building materials, the low "U" value or heat transmission factor all indicate that the cost-per-year will be lower than many building materials that may have a slightly lower initial cost.

Best news of all is that U·S·S 17 Stainless Steel for walls is available *now* for use on your current projects. You can obtain it without CMP tickets for use on any authorized construction.

If you are planning a new power plant or other type of building, U·S·S 17 Stainless Steel deserves your careful consideration. If you'd like additional information, write for our book, using the coupon below. Remember, United States Steel only produces the Stainless sheet and strip from which panels of this type are made; the panels themselves are fabricated by a number of our customers whose names will be sent you on request.

The 24" wide Stainless panels backed with 1½" Fiberglas insulation and a metal-coated steel inner plate are attached to the building's structural members by four ⅛" x 3" round-head Stainless Steel bolts.

United States Steel Company
Room 2804U, 525 William Penn Place, Pittsburgh 30, Pa.

☐ Please send me your booklet, "U·S·S 12, U·S·S 17 Stainless Steel Walls and Roofs for Industrial Buildings."

☐ Please arrange to have fabricators of Stainless Steel wall panels send me literature on their particular type of construction.

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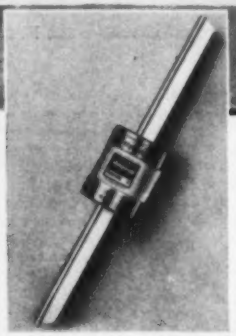

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AMP-TRAPS — *Hands At The Switch*

THE **CHASE-SHAWMUT CO.**

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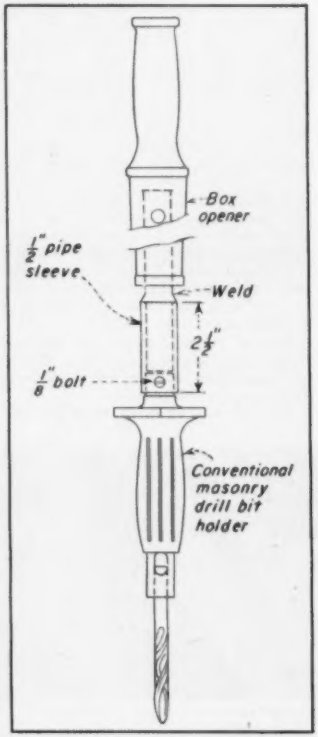
strung between poles.

The truss is composed of ½ x 2 in strap iron welded to end quarters of plank. It has a 16½-in center strut composed of a 3¼ x 4½-in crossarm bolted to a 2 x 2-in oak crosspiece. Through each end of the yellow-pine plank, which is treated with linseed oil and painted, is a ⅞ x 11¼-in countersunk bolt. Weight may be reduced by using a ¾-in rod truss welded to crosspieces which should be attached as near as possible to the plank supports with two ½-in carriage bolts to reduce bearing pressure on plank.

## Improved Masonry-Drill Holder Favored Over Hammer Type




**HOLDER for masonry drill made from discarded nail puller**

**O. G. LEIS,** Lineman, The Ohio Power Co, Lima, Ohio

This improvised masonry-drill holder is used to drill holes more safely, more rapidly, and with less effort than by using a conventional drill bit holder

(*Continued on page* 158)

# LIMITORQUE

## puts Valve Operation in the hands of Key Workers

Valves of all types up to 120" diameter can be opened and closed easily and quickly with LimiTorque. Conveniently located push button stations are the control centers from which remotely located valves, or those in high or hazardous locations may be operated by highly responsible employees. It is unnecessary to entrust important valve operations and valuable equipment to men chosen for brawn alone. Indicating lights show at a glance the exact position of each valve.

Because of its adjustable valve seating feature, LimiTorque will prevent damage to valve parts due to overload. LimiTorque may be actuated by any available power source such as electricity, water, gas, oil or air. Your valve maker can supply LimiTorque.

OUR 60TH ANNIVERSARY

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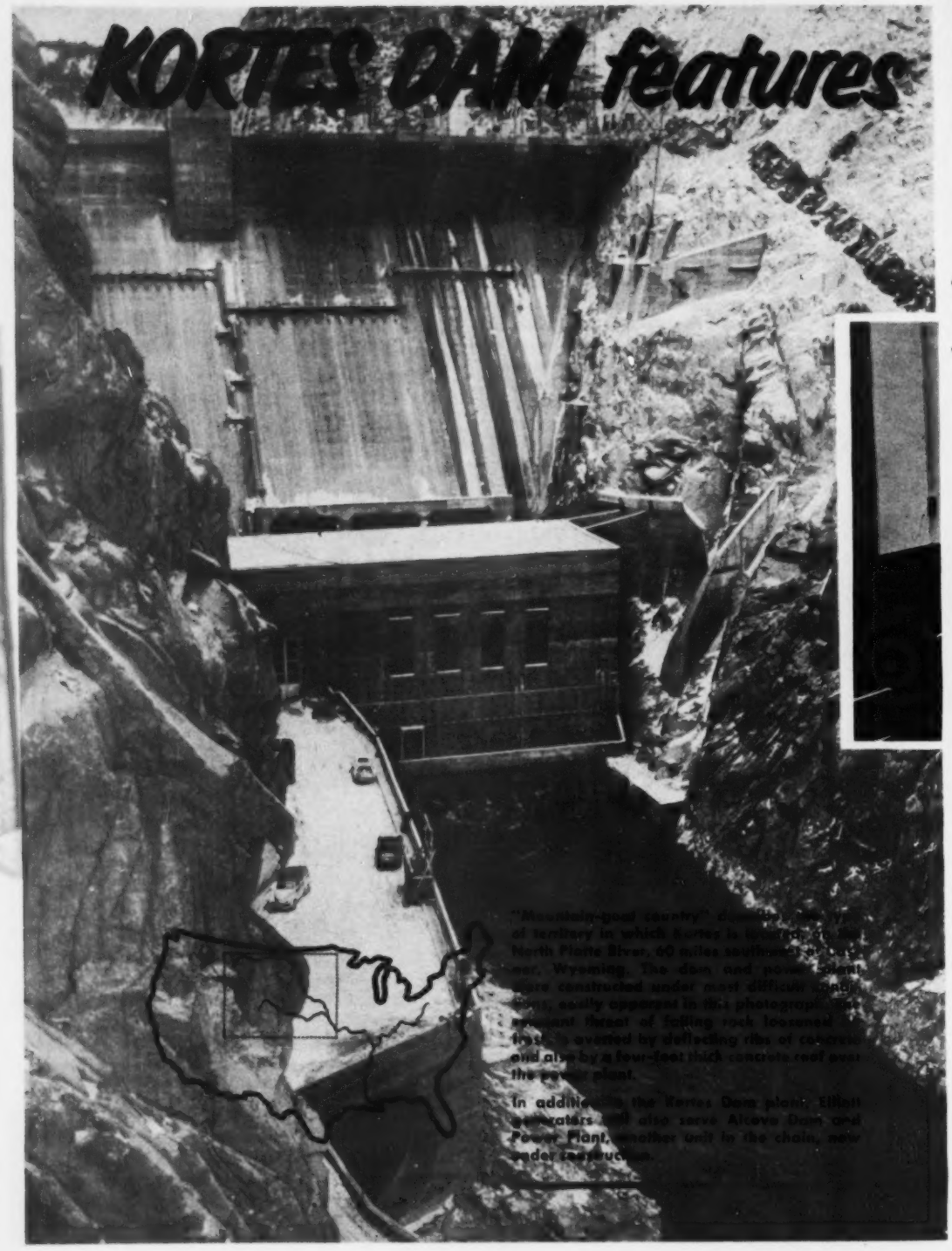
*LimiTorque Valve Controls*

# KORTES DAM features

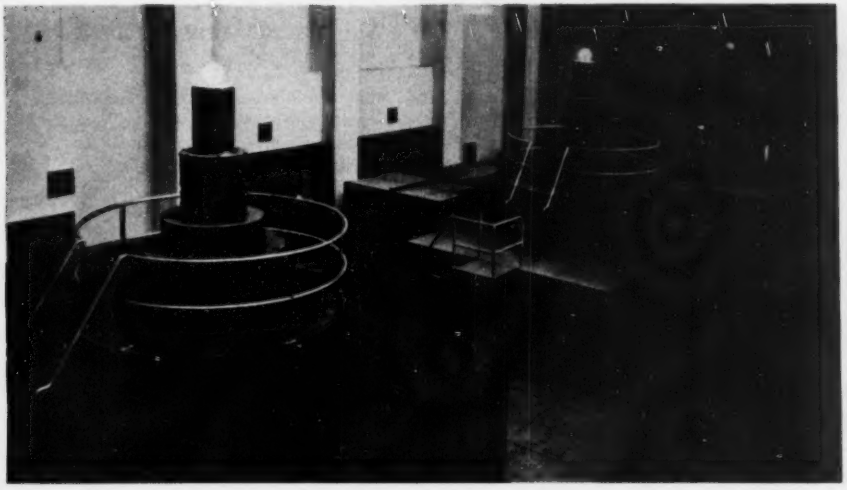


"Mountain-goat country" dominates the type of territory in which Kortes is located. The dam on the North Platte River, 60 miles southwest of Casper, Wyoming. The dam and power plant were constructed under most difficult conditions, easily apparent in this photograph. The constant threat of falling rock loosened during blasting is averted by deflecting ribs of concrete and also by a four-foot thick concrete roof over the power plant.

In addition to the Kortes Dam plant, Elliott generators will also serve Alcova Dam and Power Plant, another unit in the chain, now under construction.

# three ELLIOTT generators

**The first link in the vast Missouri Basin Project for power, flood control and reclamation, starts operation. ELLIOTT generators will also serve other related plants in the chain.**



*The three Elliott vertical generating units at Kortes. They are the first to supply power in the Bureau of Reclamation's big Missouri Basin development.*

THREE ELLIOTT VERTICAL GENERATORS driven by Francis-Type turbines, transform formerly wasted water power into valuable electric energy at Kortes. Each is rated 13,333 kva, .9 pf, 12,000 kw, 3 phase, 60 cycle, 6900 volts at 240 rpm. Thrust bearings are located above the rotor, and guide-bearings in upper and lower bracket oil pots. Two air-to-water heat exchangers for each unit handle all cooling needs. A field test on one of the generators showed operating efficiency considerably beyond specified requirements.

The Missouri Basin Project covers part or all of ten states, in an area thirten times the size of the Tennessee Valley. The selection of Elliott generators to serve the Kortes Dam station as well as others still to be completed, is significant of the confidence which Elliott products have won in the highest engineering circles.

*For details on Elliott generators and motors, contact your local Elliott representative or write Elliott Company, Ridgway, Pa.*

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## Masonry Drill Holder

(*Continued from page* 154)

and a hammer. It was made from a nail puller or box opener which was discarded after the claws broke off, by fitting the handle to a conventional drill bit holder. This was done by cutting off the claw-shank far enough from the handle to permit welding it to a ½ x 2½-in pipe. Also the striking end of a conventional bit holder was ground until it just slipped into the open end of the pipe sleeve. The assembly was made stable by drilling through for a ⅛-in bolt.

## Substation Fence Must Be Safely Grounded

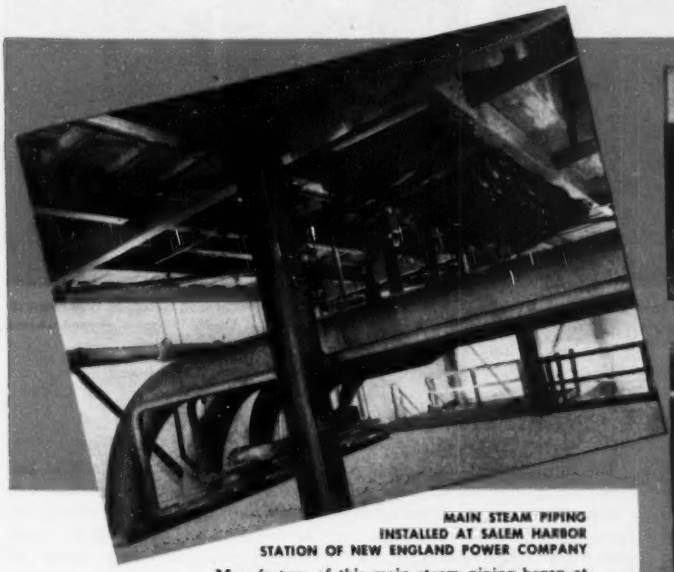
For routine substation inclosures, where the fence is 25 ft or more from the substation and equipment structures and all current get-aways are underground, engineers of one eastern utility consider it not wise for the fence to be tied to the station ground. This is of course not applicable if the fence is in hazard of coming alive from a falling overhead wire.

Since the resistance between the substation ground and true ground is always some finite value, whenever a fault current flows a potential gradient will exist between the station ground and true ground. The value of the potential gradient depends on the value of the fault current and the separation between station ground and true ground.

If the fence, whose posts are also some finite resistance above true ground, is tied to station ground, this same potential gradient will exist on the fence. Anyone touching the fence will be subject to a potential which may vary from annoying or painful to dangerous, depending on the fault current, the portion of the potential gradient contacted and the type of contact with the ground. Even though the current is too small to trip the feeder breaker and the circuit voltage is only 4 kv, the effect can be painful.

Burying a standard ground wire 1 ft outside the fence reduces the potential gradient but not to as low a value as when the fence is not tied to the station ground. If the fence is not exposed to carrying fault currents, either through being tied to station ground or from falling overhead wires, the resistance through which the fence is grounded is of minor importance.

# What it takes to make steam behave *at 1450 psi and 1000° F!*



**MAIN STEAM PIPING INSTALLED AT SALEM HARBOR STATION OF NEW ENGLAND POWER COMPANY**

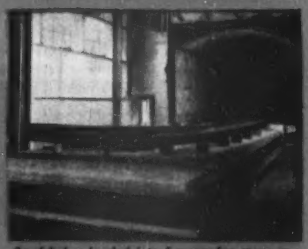
Manufacture of this main steam piping began at Pennsylvania Forge Corporation as 20-ton alloy-steel ingots (2¼% chrome, 1% moly steel). Four days' forging changed the ingots into solid bars 30 ft. long, with outside diameter of 15½ in. Boring, turning, sizing and finishing followed.

FABRICATION of the main steam line for the Salem Harbor Station of the New England Power Company, vital link in more than 52 miles of piping fabricated by Grinnell, is an example of the *many* skills required of Grinnell piping specialists. Grinnell chemists, metallurgists, physicists and radiologists . . . *all* played a part in the bending, welding and testing operations.

The integration of complex, highly technical skills like these into a *single* organization of trained specialists explains Grinnell's leadership in the field of prefabrication. It explains, too, why your interests are best served when you call upon Grinnell's expert personnel and specialized facilities in the solution of your piping problems.

Bending furnace raises pipe temperature to 2000°F in 3 hours, 40 minutes. Thermocouples and pyrometer measure pipe temperature.

Skilled team completes bend in six minutes. Inside surface temperature dropped about 100°F.



Sand being loaded into furnace for stress relieving. Heat maintained at 1425°F for 4½ hours, then gradually reduced.

Ultrasonic inspection of wall after cleaning of pipe shows maximum thinning in bend of 1/16 inch.

# GRINNELL

**WHENEVER PIPING IS INVOLVED**

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

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# INDUSTRIAL APPLICATIONS

ZINC POTS heated with electric elements have uniform, easily controlled heat. Working conditions are improved over former coke-fired method. Overall galvanizing costs are lowered

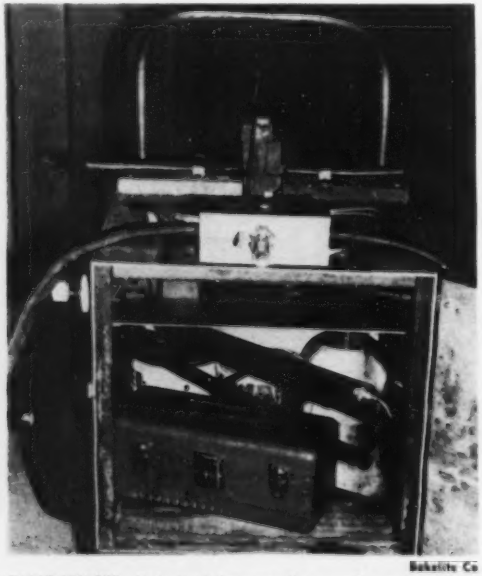
CONTROL PANEL for zinc pots permits automatic and accurate temperature control. Collins Van Gorden, Foreman of Maintenance, is shown with the control equipment

## Electric Heat Lowers Galvanizing Costs

A lower overall galvanizing cost, more accurate and uniform temperature control, and better working conditions have resulted from the use of electric resistance heating for the zinc pots at the East Stroudsburg, Pa., plant of the Line Material Co. The former method employed coke for fuel.

The furnace is 12 ft long and has three heating units on each side—with a total of 150 kw. It operates 24 hr daily, six days a week—consuming about 14,000 kwhr weekly.

A study made several years ago of all galvanizing costs in all six plants of this company—with three using electric and three using fuel-fired kettles, showed a 32 to 41% lower overall galvanizing cost with the electrically heated kettles. The highest overall electric cost was 16½% below the lowest equivalent cost for the fuel-fired plants, after adjusting for the difference in labor and zinc costs.



Bakelite Co

CABLE SPLICER eliminates labor costs for removing and installing new cables and reduces spare cable inventories

## On-The-Job Splicer Cuts Cable Costs

A new electric cable-splicer has been developed by Consolidation Coal Co, Fairmont, W. Va. Operated by one man, cost per splice is only about $1.50 for No. 4 three-conductor cable. Labor costs for removing old and installing new cables are eliminated and spare cable inventories can be reduced by this newly-developed on-the-job splicing method.

Vinylite resin plastisols are changed from liquid to solid state by electric heat, producing a tough, flexible plastic insulation which is claimed to withstand temperature and humidity extremes, moisture, abrasion, grease, oils, and most chemicals.

Operator wheels a combination workshop and supply cabinet to the scene of a cable break and permanently splices two or three-conductor cable, copper size No. 4, 2, or 1, in approximately 30 min.

Separate molds for each cable size consist of two sections, each containing two 150-w heating units. A cable attached to the repair cart supplies 250-v dc.

After curing 5 min at 325 to 375 F, the cable is removed from the mold and allowed to cool before excess plastisol is trimmed off.

# FINEST DISTRIBUTION PINTYPES EVER MADE

## THANKS TO VICTOR PURIFIED PORCELAIN!

**There are many reasons why power men are partial to Victor Pintype insulators . . . but the biggest is that they're made of VICTOR *PURIFIED* PORCELAIN— finest insulator porcelain ever made! *PURIFIED* PORCELAIN gives these pintypes a strength and resistance to impact that are unequalled. Puncture values are higher. Uniformity, hardness, density and durability are greater than ever before!**

**AND, remember, every Victor Pintype is electrically tested before shipment.**

***The result*—dependability under *all* service conditions!**

**VICTOR INSULATORS, INC., VICTOR, N. Y.**

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**For the larger aluminum conductors being used today, Victor has increased wire groove sizes on distribution pintypes. For complete engineering data, write today for Bulletin No. 4.**

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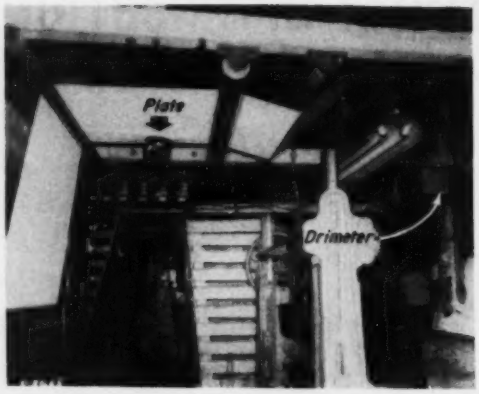
## Electronic Moisture Control Saves Heat and Overdrying



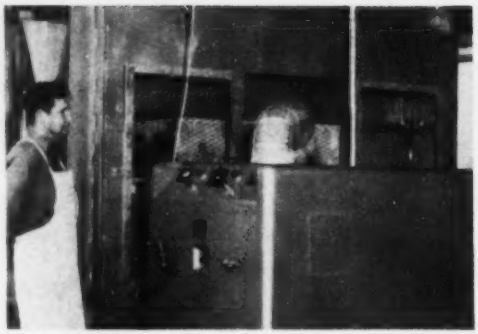

An electronic drimeter used at the Cold Spring Bleachery, Yardley, Pa., helps to keep accurate control of the moisture content of cloth during drying process and improves the finish of the cloth. Capacitance created by moisture in the cloth as it passes between two plates creates a signal in an electronic device and indicates when operator of drying machine should increase or decrease heating required for proper drying and finish. Before drimeter was used, dryness was judged by sense of touch and there was often a tendency to overdry which resulted in waste of heat. L. Albertson, Application Engineer, Philadelphia Electric Co.

## Contour Glue Drying Speeded

**L. B. REED,** Industrial Power Consultant, Dept. of Water & Power, City of Los Angeles

A high frequency generator sets glue for contour molding modern furniture in a matter of seconds at Craft Furniture Mfg Co, Santa Monica, Cal. Former method using steam-heated molds was slow and worked hardship on manufacturer having no other use for steam.

Sheets of wood approximately ⅛ in. thick are passed through rolls like an old-fashioned wringer. Glue is evenly distributed by spiraling grooves in rollers. The sheets are then placed in the press between the sheet-metal faced halves of the wooden die. Pressure of 150 lb per sq in. shapes the sheets of wood and applies gluing pressure. The glue is dried and set with 12-kw, 12 megacycle high frequency unit. Longest period for any of their operations takes 9 min during which the unit is energized only 6 min.



**GENERATOR** for h-f glue drying is rated at 12-kw output and operates at 12 megacycles. Longest drying period is 9 min

The dielectric heat completely drys and sets the glue during this period. This is a large reduction in time over other methods.

## INDUSTRIAL BRIEFS

**Continuous spot welding** with "four-head" electric welder produces 600,000 sq ft of metal "Q-flooring" monthly at H. H. Robertson Co, Ambridge, Pa. Three 22,000/440-v 500-kva transformers, located on balcony above welder, reduce 440-v circuit length—save copper, provide better voltage regulation, and save floor space. Capacitors on welder circuits further help maintain good voltage. E. M. Wenner, Industrial Power Engineer, Duquesne Light Co, Pittsburgh, Pa.

**Plasticizing** laminated material for valve cups by means of dielectric heating has increased production 100% and materially improved quality of the product at Lubrikup Co, Inc, in Williamsport, Pa. Material is plasticized in the dielectric heater prior to being subjected to pressure. One 10-kw, 230-v unit has replaced a steam oven. K. H. Breon, Industrial Rep., Pennsylvania Power & Light Co.

**Power factor** is improved at Ross-Meehan Foundries, Chattanooga, Tenn., by use of watt-var meter. Formerly pf of total load ran 65-78% with 700-800-kw resistance heating load, 1000-kw motor load, and 1500-kw electric melting furnace. Test and analysis showed melting furnace meltdown period was causing low pf on almost every peak. Watt-var meter was applied to furnace circuit where furnace operator could watch his watts for 39 sec of each minute and his kvar's for the remaining 21 sec of each minute. The operator has been briefed about keeping kvar's to a minimum so that with same loads pf is now running 85-90% at peak. Service voltage is 12,000 metering transformers on high voltage side. W. G. Davies, Chief Power Sales Eng, Electric Power Board of Chattanooga, Tenn.

**Drying drugs** in electric oven at Wm. S. Merrell Co., Cincinnati, Ohio, permits close temperature control, faster drying and freedom from steam leaks. Oven has 6 kw of strip heaters operating on 220 v, three-phase service. Motor-driven blower provides forced air circulation. Oven has thermostatic control and useful range of operation from 80 to 125 C. L. J. Langevin, Power Engineer, Cincinnati Gas & Electric Co.

# "We get CONSISTENTLY EXCELLENT RESULTS with D-H ALLOYS"

## ...says *Resistance Products Company, of Harrisburg, Pennsylvania*

This company produces precision wire-wound resistors of utmost stability for electronic equipment used by the Armed Forces and for makers and users of test instruments, meters, and scientific apparatus of various types. The vital accuracy of much important equipment, therefore, is very dependent upon the quality of the resistors coming off the production lines of Resistance Products Company.

In view of this, Driver-Harris is particularly gratified to have Resistance Products state: "Reflecting our experience with Driver-Harris alloys is our large use of Karma wire. Currently, we are employing Karma for numerous critical applications where utmost stability, together with high resistivity and low temperature coefficient of resistance, is requisite. *Consistently excellent results* are being obtained. We have, in fact, used Karma with outstanding success ever since its introduction several years ago. It is our belief the development of this alloy constitutes a major forward step."

Karma* is ready to serve you, too; as are world-famous Nichrome* and Nichrome V, and over 80 other alloys developed by Driver-Harris for the electrical and electronic industries. We feel confident that, like Resistance Products Company, you'll realize exceptional advantages by putting one or more D-H alloys to work for you. Let us have your specifications. We'll gladly make recommendations based on your specific needs and have our engineering department help you obtain best results.

KARMA* and world-famous Nichrome*
are manufactured only by

**Driver-Harris Company**
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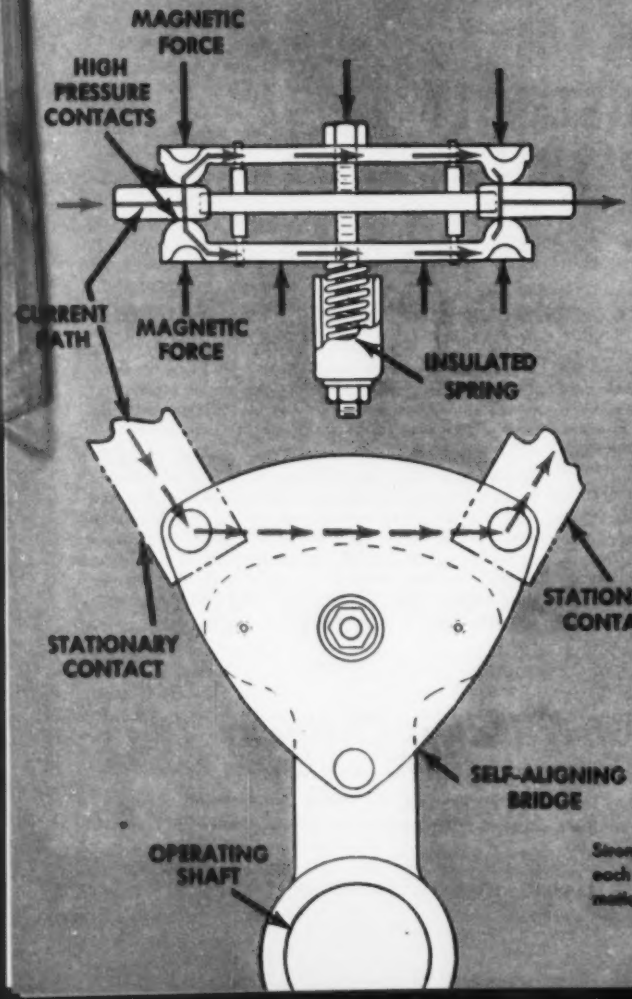
In Canada: The B. GREENING WIRE COMPANY, Ltd., Hamilton, Ontario.

*T.M. Reg. U. S. Pat. Off.

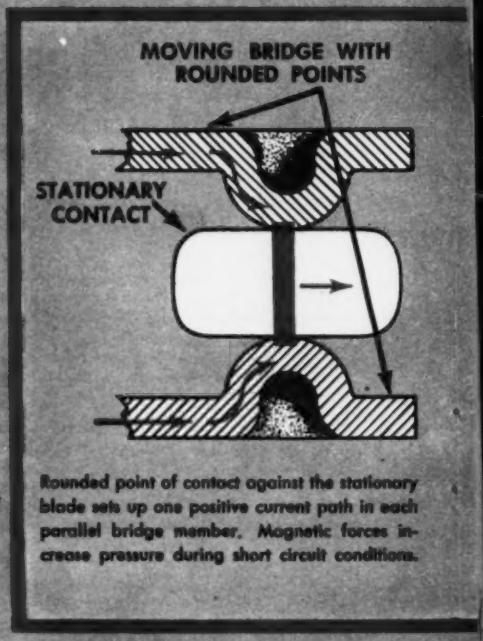
MAKERS OF THE MOST COMPLETE LINE OF ELECTRIC HEATING, RESISTANCE, AND ELECTRONIC ALLOYS IN THE WORLD

# new tap changer design

# MAINTAINS TRUE CONTACT ALIGNMENT




Strong, flexible spring action maintains equal pressure on each corner of the triangular bridging parts for perfect automatic tap changer alignment.




Rounded point of contact against the stationary blade sets up one positive current path in each parallel bridge member. Magnetic forces increase pressure during short circuit conditions.

# Uses New Contact Principle to Assure Cool, Long-life Operation on Allis-Chalmers Power Transformers

HERE'S A NEW TAP CHANGER for de-energized operation, using a new contact principle that keeps it cool in operation and extends operating life. Designed for use on Allis-Chalmers power transformers, the tap changer meets the approval of utilities which have sought an improved tap changer performance. It helps Allis-Chalmers power transformers do a good job better.

### Here's How It Operates

A positive, fixed current path established under high unit pressure is the basic design principle of the new tap changer. Two sets of rounded contact points establish a low-resistance path when they meet the flat stationary contacts on the tap changer panels. A strong wiping action thoroughly cleans contacts whenever tap positions are changed. And elimination of carbon formation adds years to tap changer service life and lowers contact resistance.

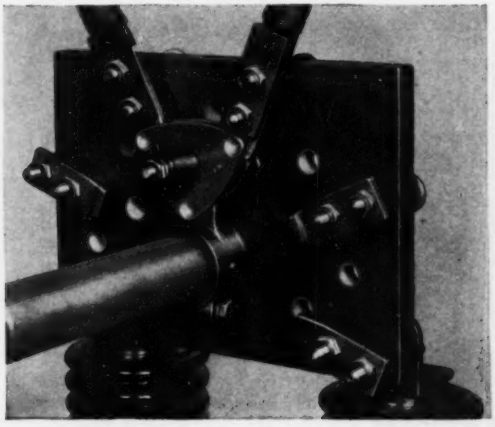
### Equal Contact Pressure

The movable contact bridge is designed so that the current travels through parallel members between the stationary contacts. This creates magnetic forces that prevent "throw open" action when a short circuit occurs on the system.

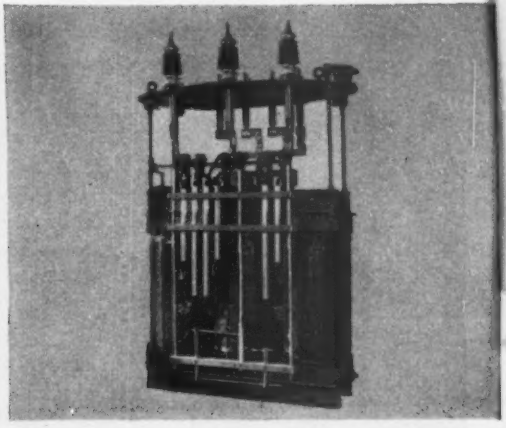
To maintain equal pressure at points of contact, flexible spring action operates between fixed limits. And the self-aligning bridge arrangement assures automatic and true alignment for each operation.

If you haven't seen the technical sheet describing the tap changer in greater detail, get one from your local A-C representative today or write Allis-Chalmers, Milwaukee 1, Wis.

A-3755



Rounded edges and insulated parts of the tap changer assembly reduce voltage stresses and minimize corona. Oil leakage holes prevent air pockets around mounting bolts.



The new tap changer is easily accessible for periodic inspection through the cover handholes. Tap positions are changed in all phases simultaneously.

# ALLIS-CHALMERS

A-C ALLIS-CHALMERS

LIGHTING INTENSITY on the new Atlanta expressway is 50% above IES recommendations

## Mercury Lights Atlanta Freeway and . . .

Pattern for lighting the 32-mile ultimate length of the new Atlanta, Ga., expressway is set in the 2.2 miles on which fixtures have now been installed. On the freeway are 137 mercury vapor Type IV luminaires with 15,000-lumen AH-1 lamps. Units are mounted 28 ft above the pavement on 15-ft upsweep arms and are spaced 110-140 ft in staggered arrangement. Approaches to the freeway are lighted with 10,000-lumen incandescent lamps 28 ft high, 120 ft spacing.

Intensity on the expressway is 1.2 ft-c, 50% above IES recommended practice. On the approaches intensity is 0.6 ft-c. The expressway lighting system is owned and maintained by the municipality. George Power Co supplies electricity at $1.75 per month for each mercury lamp and $2 per month for the incandescent.

General Electric Co

## . . . Raleigh's Business District

A tenfold illumination increase in the Raleigh, N. C., business district has resulted from installation of 139 21,000-lumen mercury vapor street-lighting fixtures on its main street and immediate vicinity.

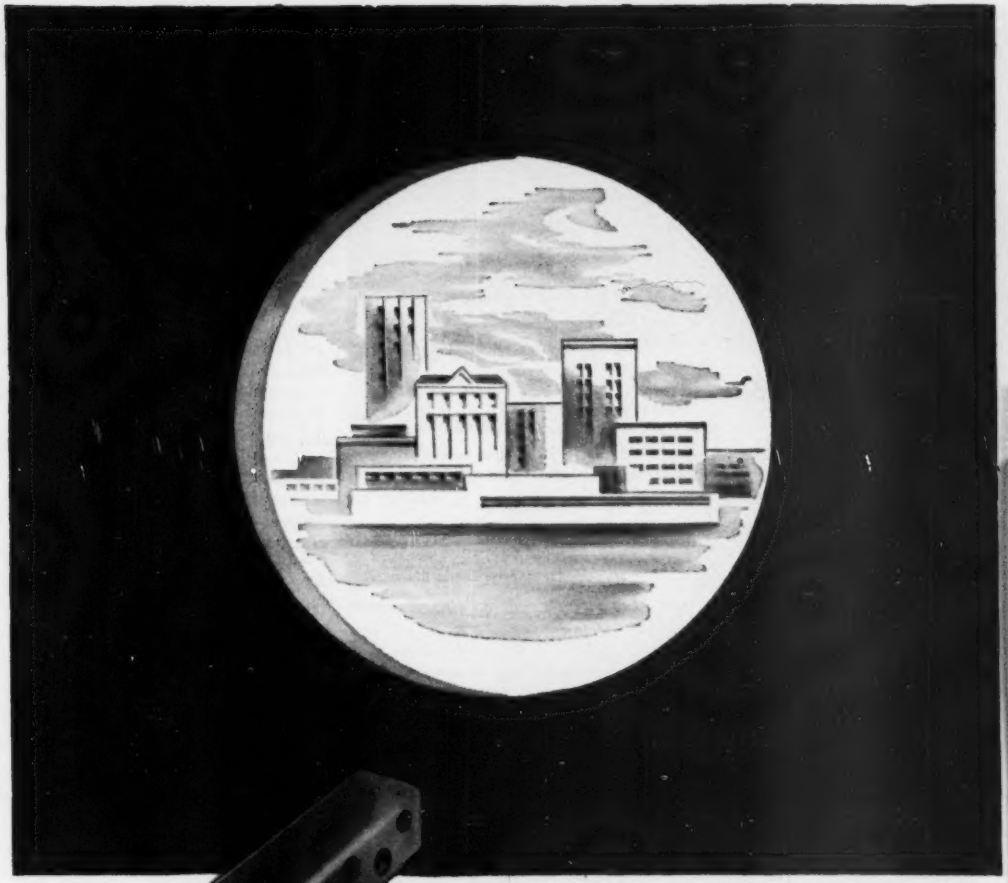
Installed by Carolina Power and Light Co at a cost of about $50,000, the lights replaced 212 old fixtures. Level of illumination at intersections now exceeds by 250% the value recommended by Illumination Engineering Society. Lights are mounted at a height of 27 feet—an increase of 13 feet over the previous installation.

## Light on the Law

Standing in the center of an intersection, directing traffic at night, the officer on duty is in greater danger than during the daylight hours. His safety can be increased, as audience attention is drawn to the principal performer in the theatre, by putting a spotlight on him. For this, the new 500-watt, R-40 spotlight is ideal. Here, at an intersection in Brentwood, Mo, a suburb of St. Louis, is Traffic Officer Stewart Ducey all lighted up by an R-40 in a standard street hood suspended 16 ft above the pavement, 210 ft-c on his cap and up to 125 ft-c on his white-gloved hands. Carter Lewis, Union Electric Co of Missouri.

## Holiday Lighting Booklet

New large-scale lighting ideas for the forthcoming holiday season are featured in a 20-page booklet prepared by the Westinghouse Lamp Division. The work of several Westinghouse engineers, it is called "63 Brilliant Ideas for Christmas Lighting." Described through drawings are showcase lamps, spot and floodlamps for indoor and outdoor use, Christmas tree lamps, and a variety of other equipment.



## Who put the windows in Bus Conductors?

The "windows" are ventilating holes which Chase engineers put in to aid the dissipation of heat. They increase the current carrying capacity about 20% over unventilated tubes. And a ventilated square tube bus conductor means saving up to 36% in the weight of copper used.

When you add to this high mechanical strength, ease of assembly and erection and resistance to corrosion, you'll agree that Chase square copper tube conductors are ideal. Write Dept. EW 952 for the Chase Bus Conductor Handbook.

**Chase BRASS & COPPER**

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

• *The Nation's Headquarters for Brass & Copper*

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| Cincinnati | Indianapolis | New Orleans | St. Louis | |

DRIVE-WAY-LITE marketed by Lorain-Medina Rural Electric Cooperative insures safer passage for auto in or out of driveway, and makes car more apparent to approaching drivers

## Drive-Way-Lites For Safety

Driveway lighting units to lessen night driving hazards are being pushed in the central Ohio rural market by the Lorain-Medina Rural Electric Cooperative, Wellington, Ohio. The "Drive-Way-Lites" illuminate the driveway at the point where it meets the highway, providing the driver a clear view of the driveway entrance, and making the car more visible.

The co-op, which introduced the units to some members without cost except for the electricity used, is selling them now for $20, complete with pole, mastarm, 100-watt bulb and shade, completely wired.

Fifty of the Drive-Way-Lites were installed in the first three weeks, with a second lot of 50 now being prepared. Under average conditions, the current costs should not exceed 45 cents a month per unit, according to Karl B. Crawford, manager of the cooperative.

Landers, Frary & Clark

## Living From Hand to Mouth

Frigid Dough Co of Houston, makers of frozen waffles, are adapting a domestic appliance to further their commercial fortunes. Using 16 waffle irons in a double bank of eight on its production line, Frigid Dough employees painstakingly pour the batter to produce four single portions of waffles at each baking. Day-long production: 4,000 waffles.

## News Letter Prepared For Farm Customers

Directed to its rural customers, Connecticut Light & Power Co's Farm Service Department has begun issuing a bi-monthly news letter, "Farming With Electricity." Adaptation of one basic electrical application to specialized kinds of farming will be discussed in each issue of the two-page leaflet.

First issue is on "Refrigeration." It cites advantages of cooling milk cans by the spray method, and of tank truck pickup of bulk milk. Also discussed are prefabricated walk-in freezers and home built storage and freezing units.

Besides featuring new developments in electrical farm equipment, efforts will be made to indicate the increased volume or improved quality of production that can be obtained with adequate mechanization and electrification. Greater output per manhour will be featured.

Each issue is accompanied by a prepaid postcard to enable the farmer to request more information from local farm service representatives.

## Two Utilities Share In Promotion Prizes

Duquesne Light Co, Pittsburgh, and the Springfield branch of Ohio Edison Co were among the winners in the Electric Housewares Gift Campaign promotion contests sponsored by the Electric Housewares Section of the National Electric Manufacturers Association.

Duquesne Light won from among electric light and power companies competing in the newspaper ad contest. Ohio Edisons' Springfield branch was selected as having the best housewares display among the utilities.

Entries in the display contest more than doubled those of last year. This was the first time a newspaper ad competition was held.

## Corrosion-Proof Rod Developed for Heaters

An 18-inch-long rod designed to eliminate scale and corrosion on consumer water heater tanks and electrical heating elements has been adopted by the San Diego Gas & Electric Co for installation on all electric water heaters serviced by its appliance serv-

(*Continued on page* 173)

# NEW LOAD PICKUP SECTIONALIZER SOLVES PROBLEM OF RE-ENERGIZING HEAVILY LOADED FEEDERS

Continued load growth and increasing use of automatically controlled motor loads present serious problems of re-energizing feeders after extended outages. The new Westinghouse "LPS" (Load Pickup) Sectionalizer offers a permanent solution to this growing problem on radial distribution feeders.

## Operation on Extended Outages

Loss of diversity, and inrush currents after extended outages operate the station breaker through its tripping sequence. The "LPS" counts the pulses of overload current created by the opening and closing of the breaker—it opens during the third open-circuit time, dropping its portion of the load. Control voltage (110 volts) from the line side of the "LPS" operates its relays to close the "LPS" after an adjustable time delay, picking up the remainder of the load.

Automatically picking up the distribution system in sections reduces the maximum inrush current, permitting low, and thus more sensitive relay settings.

## Operation on Faults

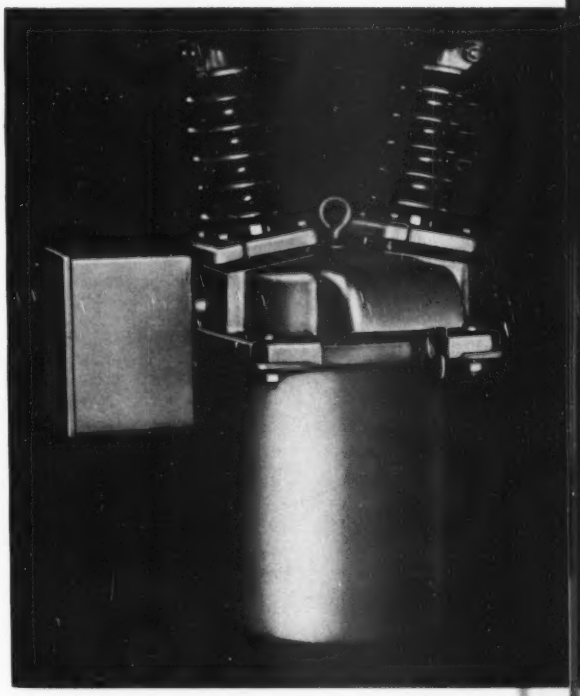
The "LPS" sectionalizer also has the desirable feature of being able to sectionalize the load it controls, should a permanent fault occur in that area. A fault at "X" operates the station breaker through its tripping sequence. The "LPS" counts the pulses of fault current and opens during the third open-circuit time, disconnecting the faulted portion of the system. The mechanical trip-free mechanism in the "LPS" prevents the control voltage from closing it on the fault until reset by the lineman.

## A Versatile New Tool for Your Distribution System

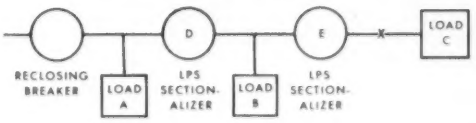
The "LPS" control relay has adjustable pickup times of two to thirty minutes. The fault counting sequence may be varied from one to three counts. Control voltages of 110, 220, and 460 volts are available.

Three "LPS" sectionalizers may be secured, mounted and wired on a channel for three-phase installations.

For complete information on the new Westinghouse "LPS" sectionalizer, write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pennsylvania.

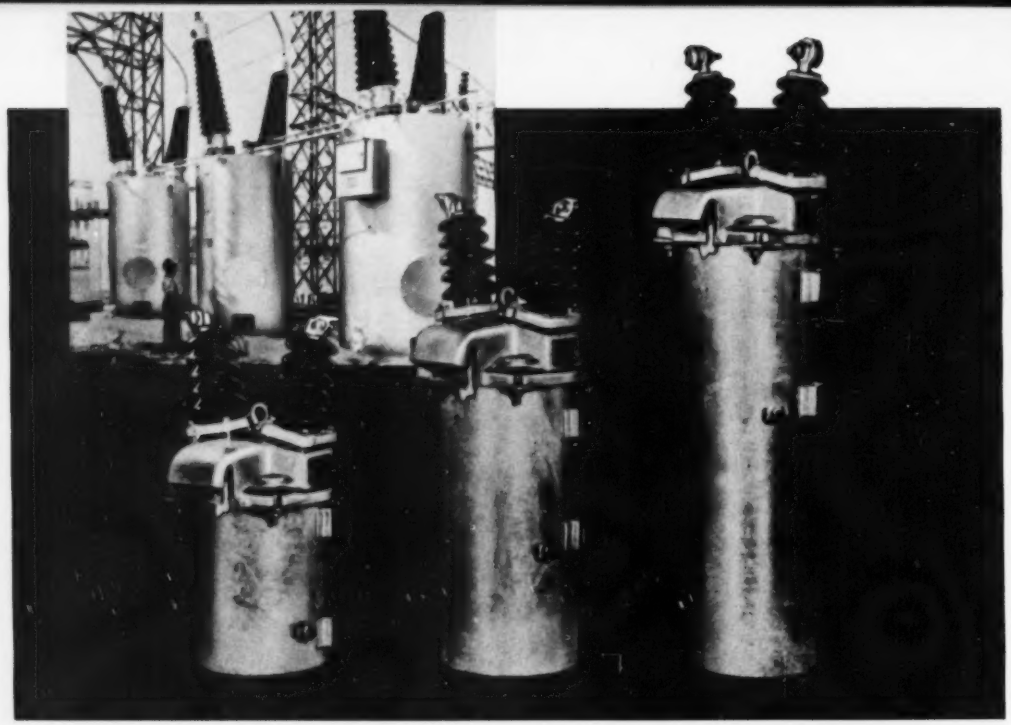


Type "LPS" Load Pickup Sectionalizer.




Typical application of "LPS" Load Pickup Sectionalizers. "LPS" at point E would be set to add Load C to system after Loads A and B have regained diversity.

YOU CAN BE SURE...IF IT'S
Westinghouse
DISTRIBUTION APPARATUS



GRS SECTIONALIZER—15 kv, 5 to 100 amperes, 6,500-ampere max. momentary rating.

50-GR RECLOSER—15 kv, 5 to 50 amperes, 1,200-ampere max. int. rating.

100-GR RECLOSER—15 kv, 25 to 100 amperes, 2,500-ampere max. int. rating.

# "BIG BREAKER" ENGINEERING BACKS WESTINGHOUSE RECLOSER AND SECTIONALIZER DESIGNS

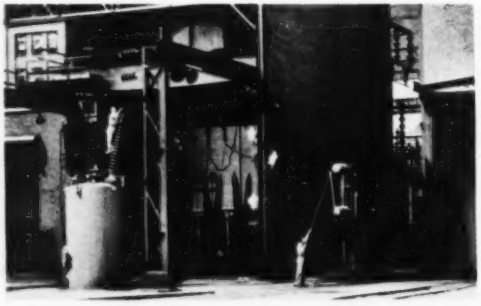
Westinghouse Reclosers and Sectionalizers are fundamentally small oil circuit breakers. Knowledge gained from years of experience in designing, building, and testing big breakers—with interrupting capacity of 10,000,000 kva and higher—has been applied to the development of Westinghouse Reclosers and Sectionalizers.

This knowledge covers the efficient interruption of fault current under oil—adequate internal insulation co-ordinated with bushing insulation—other important factors such as time sequence and surge protection.

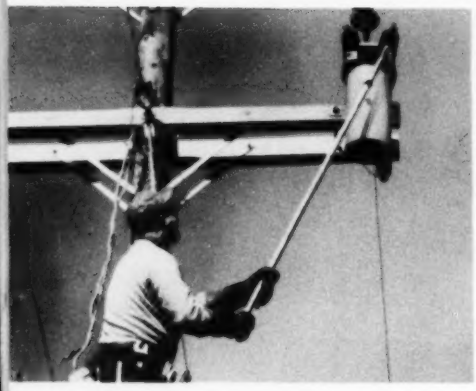
## High Power Laboratory Testing

Complete testing of Reclosers and Sectionalizers is important just as it is in the case of large breakers. This testing is done in the Westinghouse High Power Laboratory under the same accurately controlled conditions.

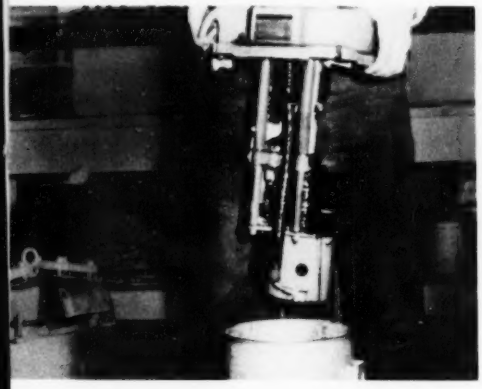
Testing under the most severe conditions—with 15,000 volts across a single recloser—with maximum symmetrical rated current—at power factor of less than 7%—is one more reason why—you can be sure, if it's Westinghouse.



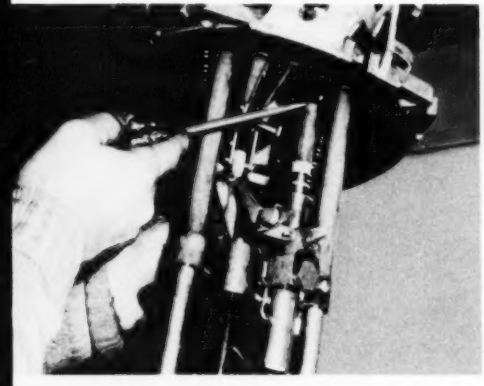
View of Westinghouse High Power Laboratory where Westinghouse Recloser and Sectionalizer designs are proved under accurately controlled conditions.



A single operation after lockout assures safety of operator. Operation is time-delay to ride through inrush currents.



Recloser is readily dismantled for inspection, change of current rating, or replacement of contacts.



A simple hydraulic timer determines tripping time, and assures positive lockout after the predetermined number of operations.

# SAFE, STURDY, EASY-TO-MAINTAIN DESIGNS

Westinghouse Reclosers and Sectionalizers are the safest, most dependable devices available today. Safety is insured by a heavy drawn steel tank and cast-iron cover, both galvanized for long maintenance-free life. Safety of operating personnel is further assured through a design that allows only one operation to "lockout" when closed in on a fault. To assure picking up a line after lockout—this one operation is a "time delay" operation and will ride through and pick up inrush currents associated with a "cold line" without unnecessary openings.

Loosening four clamps which fasten the cover to the tank permits quick inspection of the contacts, tank liner, and oil. The contacts then may be replaced using only a pair of pliers. An inexpensive contact replacement kit makes this job doubly easy.

## Wide Variety of Tripping Sequences Available

Tripping times are determined by a simple trouble-free hydraulic timer. A mechanical ratchet changes the operation from instantaneous to time delay and insures positive lockout after four operations under any condition of fault current or operating temperature. The simple mechanical ratchet permits selection of up to nine combinations of instantaneous and time delay openings.

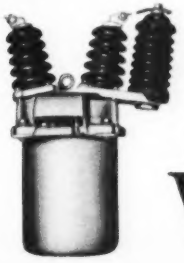
## Temperature Compensation

Since the timer element is hydraulic, it is affected by oil temperature. Westinghouse Reclosers are available with temperature compensation for all locations where extremely low temperatures create fuse-recloser co-ordination problems.

## Co-ordinated Lightning Protection

For completely self-protected reclosers—bushing-mounted expulsion arresters are available for mounting on any Westinghouse Recloser and Sectionalizer, as shown below.

For complete information, ask your nearby Westinghouse or Westinghouse distributor salesman for: DB 38-680—50-GR reclosers; B-4339—100-GR reclosers; DB 38-690—GRS Sectionalizers. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.



YOU CAN BE SURE...IF IT'S

Westinghouse

# THE INDUSTRY'S MOST COMPLETE LINE OF CUTOUTS gives you unmatched versatility in line protection

Note how this line-up of Westinghouse Cutouts meets every requirement of versatile line protection. First—a choice of four basic housings (from front to rear): 50 ampere for 5000 and 7500-volt service, and 100 ampere for 5000 and 7500-volt service. Second—five individual doors, interchangeable in the same ampere rating housing (left to right): Standard-duty indicating, standard-duty non-indicating, heavy-duty indicating, heavy-duty non-indicating, and disconnect blade.

All doors fit perfectly into the housing because Prestite* porcelain, used exclusively by Westinghouse, provides a cutout offering exceptional dimensional fidelity. Positive dropout action gives a clear indication of a blown fuse. Hookstick operation permits safe, fast re-fusing. Cool operation assures long, trouble-free life. Westinghouse Cutouts have an enviable record of trouble-free service under severe temperature conditions.

For complete information on Westinghouse Cutouts ask for copies of Booklets DB 38-625 and DB 38-628. Contact your Westinghouse representative or Westinghouse distributor or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-60791

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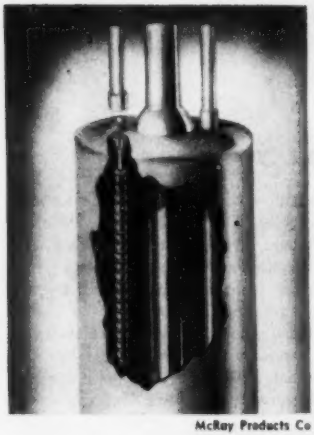


McRay Products Co

ice department. It is operated on the theory that electrolytic action, which "de-zincs" galvanized tanks and scale deposits on tanks and heating elements, takes place within the rod itself, rather than on the tank.

Mounted on a stainless steel core, the rod has a series of zinc slugs separated by brass spacers and copper discs. Since being patented five years ago, it has undergone rigorous testing by S.D.G.&E.

One of the test rods was installed in 1947 in an 11-year-old galvanized tank, heavily coated with scale and rust. Two months later no element failure had resulted, no scale had deposited on it, and scale on tank walls was disappearing. The rod showed no appreciable wear. It was still operating satisfactorily in April of this year, though the rod was approximately 25% dissipated.

The government has purchased a quantity of the rods for installation in a public housing project at Oxnard, Calif., and a large plumbing firm in Salinas is using the rod to combat tank heating element failure through liming.

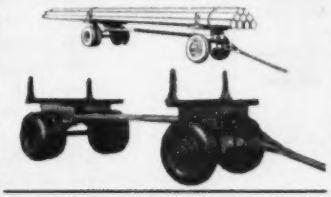
## Automatic Humidifier

The Aqua-Sorber Dehumidifier has been added to the humidifier line manufactured by Walton Laboratories, Irvington, N. J. According to the company, it is the first dehumidifier to include an automatic control which saves on power consumption, its control being activated by moisture content of the atmosphere. Thus, it operates only when necessary, rather than at timed intervals.

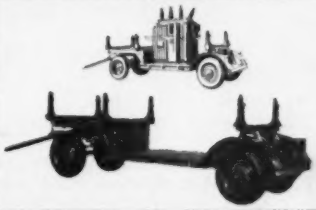

**Notes on Eagle Equipment — Designed to save man-hours and money**

**TRAILERS**

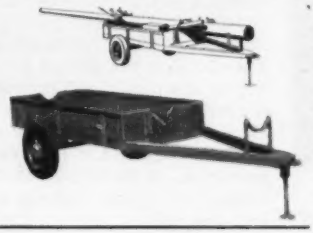
**...IN A WIDE RANGE OF SIZES AND TYPES**



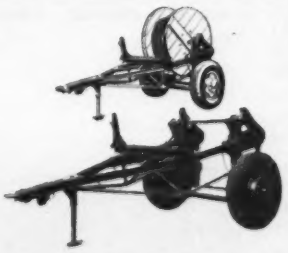
**ADJUSTABLE LENGTH POLE TRAILER:** easily adjusts to accommodate poles up to 90 ft. long — a big trailer that does a big job. Center pole telescopes. Trails smoothly. Equipped with electric brakes on rear wheels. Get complete information on Eagle Trailer Model 6450.



**FOUR-WHEEL LO-BED TRAILER:** for easy loading and hauling of heavy bulky units, also suited to pole and general purpose hauling. Five ton capacity, overall length 25 ft. 8 inches. Distance ground to low platform only 25½ inches. Equipped with electric brakes on rear wheels. Get complete information on Eagle Trailer Model 6441.



**LIGHT-DUTY CARGO AND GENERAL PURPOSE TRAILER:** light-duty, 1-ton capacity trailer for hauling one or two poles, cross-arms, pole hardware, etc. Has pole saddles front and rear and removable end boards. Get complete information on Eagle Trailer Model 7163.



**COMBINATION CABLE REEL AND POLE TRAILER:** complete with bolsters, stanchions, cable reel saddles. Quickly converted into a pole trailer by removing cable reel saddles and installing bolsters. A practical dual purpose unit, requiring only one trailer license. Get complete information on Eagle Trailer PCP — W-PCP series.

*Send today for the complete catalog of Eagle Line Construction and Maintenance Equipment — a useful reference book.*

**EAGLE**

**BODIES • TRAILERS DERRICKS • TOOLS ACCESSORIES**

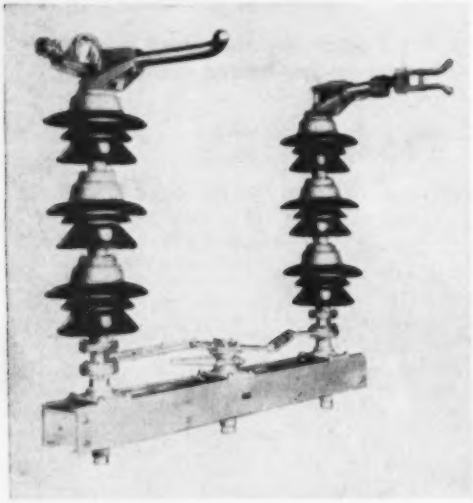
EQUIPMENT ENGINEERED BY AND FOR UTILITY MEN EXPRESSLY FOR THEIR NEEDS

Designed by Greyhair

**EAGLE MANUFACTURING CO., Appleton, Wis.**

Division of The Four Wheel Drive Auto Co.

# NEW EQUIPMENT



## Center-break Switches

Available in all standard voltage ratings from 7.5 to 161 kv and in ampere ratings of 400 (up to 46 kv), 600 and 1,200 amp, for upright and inverted mounting. PMK-22 has a direct linkage connection between the two rotating insulators. PMK-23 has a center bearing with a toggle linkage between the two rotating insulators.

Switches incorporate a contact assembly featuring independently sprung pressure-applying springs, bronze ball-bearing swivel terminal, insulator bearings with double race stainless steel ball bearings. Complete details in publication 5205.

**Delta-Star Electric Co, 2437 W. Fulton St, Chicago, Ill.**

## Electrical Dynamometer

Works on principle of deflecting a calibrated beam, is claimed unaffected by extreme temperature and suitable for field applications. It is available in 13 capacities from 0-500 lb to 0-100,000 lb. 0-500 lb unit weighs 8½ lb. 5 or 10-in. dial is protected with shatterproof crystal.

Used to operate electrical warnings, signals, relays, motors, etc. Blue hand is adjustable to any load on dial. White pointer moves with load to close contacts with blue hand.

**W. C. Dillon & Co Inc, Forest Park, Ill.**

## Laminate

Laminated thermosetting sheet material made of fiberglas mat banded with melamine resin. Called Dilecto GM-1, it is said to be suitable for switchboard panels, other structural parts. Heat resistance rated 300 F continuous, 350 F intermittent.

ASTM test methods show flexural strength 21,000-28,000 psi, impact strength 5.5-6.6 ft lb/in of notch edgewise, dielectric strength 45-50 kv step by step parallel with laminations, arc resistance 160-185 sec, water absorption 1.5-2.0% per 24 hrs for ⅛-in. specimen. Density 1.75-1.80. Present production 38x38-in. and 38x42-in. sheets ⅛-½ in. thick. Grayish white, semi-glass finish.

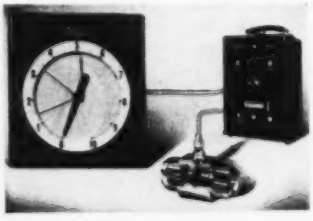
**Continental - Diamond Fibre Co, Newark, Del.**

## Regulated Power Supply

With both filament and dc voltages controllable at a central point through relays. Jacks for external meters reduce equipment cost. Regulated output voltages may be used as positive or negative supply. Cabinet for bench or relay rack mounting is 19x8x7 in.

Model 401: 250 to 500v dc at 200 ma, 650 dc at 200 ma unregulated, 6.3v ac at 6 amp unregulated. Model 402: 150 to 325v dc at 200 ma, 450v dc at 200 ma unregulated, 6.3v at 6 amp unregulated. Both models regulate to ½%, it is claimed, for load variations of 0-200 ma and line variations of 105-125v ac.

**Bristol Eng Corp, Bristol, Pa.**

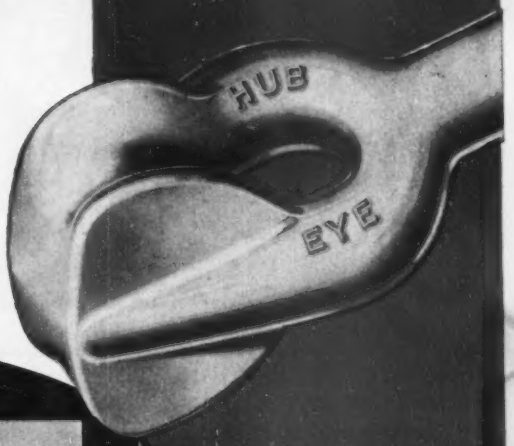


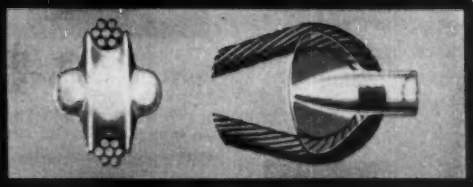
## Flowmeter

Capable of handling toxic or highly corrosive gases, viscous liquids or other fluids under pressures to 20,000 psi and temperature from 0-269 C to 1200 F. All parts except the sensing element are encased in the electronic potentiometer.

Ranging from $\frac{A}{16}$-in dia 2½ oz aluminum to 6-in dia 4,000 gpm element, the sensing unit installed in the

# "For the Best GUYS in the World"

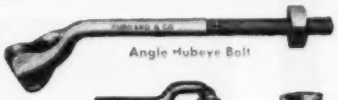


End view showing sidewall support of strand by Hubeye.

Side view showing lay of strand in Hubeye. Fully rounded bearing area is provided.

## Typical Hubbard Guying Items



Angle Hubeye Bolt

Three-Hubeye Anchor Rod

ServiSleev

Strain Plate No. 7577

Storm Guy Hook No. 6001

Strain Plate No. 7575

Storm Guy Hook No. 7585

From arm to anchor, Hubbard has a complete line of guying accessories that are "good for the life of the pole." There's a variety of anchors to meet every soil condition, to carry any load . . . guy protectors that are designed for maximum strength and visibility . . . Servi-Sleevs for the best looking serve in five seconds flat . . . Hubeye anchor rods and bolts with strand protection . . . clamps that grip the strand and won't let go . . . strain plates . . . storm guy hooks . . . hundreds of items that make it easier for the lineman to service the "best guys in the world."

**HUBBARD AND COMPANY**

ESTABLISHED 1847

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

*"Hang the Load on Hubbard Hardware!"*

● Use Electro Custom Processed Varnished Insulation to INCREASE LIFE EXPECTANCY and to *insure* the *safe, successful operation* of *electrical equipment.*

Selecting dependable insulation need not present any problem to design, insulation and maintenance engineers if they specify ELECTRO. Our method of processing produces varnished insulation with the ESSENTIAL SAFETY FACTORS.

*You may buy with confidence when you buy these*

**ELECTRO**

**TECHNICAL PRODUCTS**

- Silicone Varnished Fiberglas*
- Quin-Glas Hi-Temperature Insulation
- Varnished Fiberglas* Cloth
- Electro "300" Combination Slot Insulation
- Treated Asbestos Cloth & Paper
- Flexible Varnished Cambric Tape
- Varnished Condenser Paper
- Varnished Silk and Rayon
- Cable Wrapping Tapes

We invite you to use our Special Service facilities if you need varnished insulation to meet specific requirements. Write or phone Department E-1 for technical data and samples.

**ELECTRO-TECHNICAL PRODUCTS**

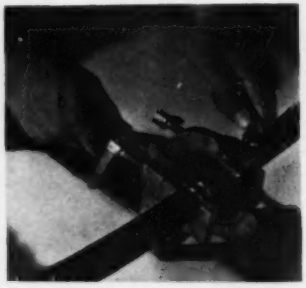
DIVISION OF SUN CHEMICAL CORPORATION

**NUTLEY 10, NEW JERSEY**

*T. M. Reg. U. S. Pat. Off. by Owens Corning Fiberglas Corp.


flow produces an ac output whose frequency is directly proportioned to rate of flow. This signal is converted, indicated and recorded in the potentiometer.

**Minneapolis-Honeywell Regulator Co, Industrial Div, Wayne and Robert Ave, Philadelphia 44, Pa.**



## Portable Crimper

Single mechanical-type hand crimping tool makes a full circumferential crimp in wire and cable sizes No. 4 through 500 MCM without die change or heat application. Tools weighs 2¾ lb, operates on ratchet principle.

**F. M. Anthony Co, Piedmont 11, Calif.**

## Insulating Resins

For complete encapsulation of electrical components. "Scotchcast" resins No 1 and 2 are claimed to have moisture-resistance, high dielectric strength and physical toughness for protecting coils, transformers, etc. Resin No 1 comes in solid form and is heated until liquified for pouring; resin sets and is cured at 250 F in 4-8 hrs. Resin No 2 comes in liquid form and can be cured at room temperature in 3-6 hr. Both resins have a dielectric

(*Continued on page* 180)

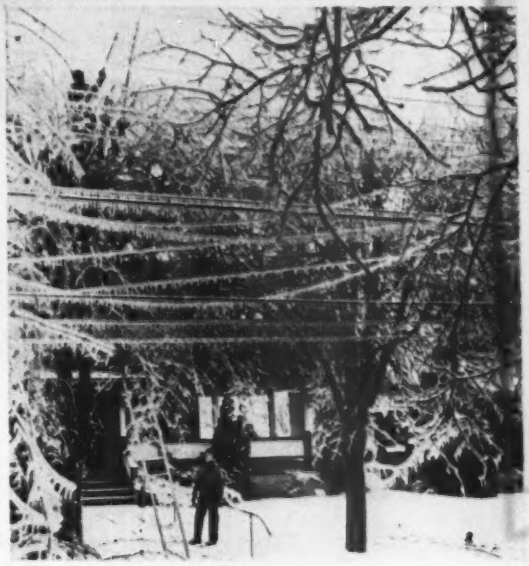
# FARGO *Automatic* SPLICES SERVE YOU BEST

# IN *All* KINDS OF WEATHER

THEY SAVE TIME AND LABOR . . . . because they're fully automatic.

THEY'RE SAFE . . . . . because they require no tools.

THEY'RE PERMANENT . . . . because their "one-piece" jaw gives them greater strength and holding power.



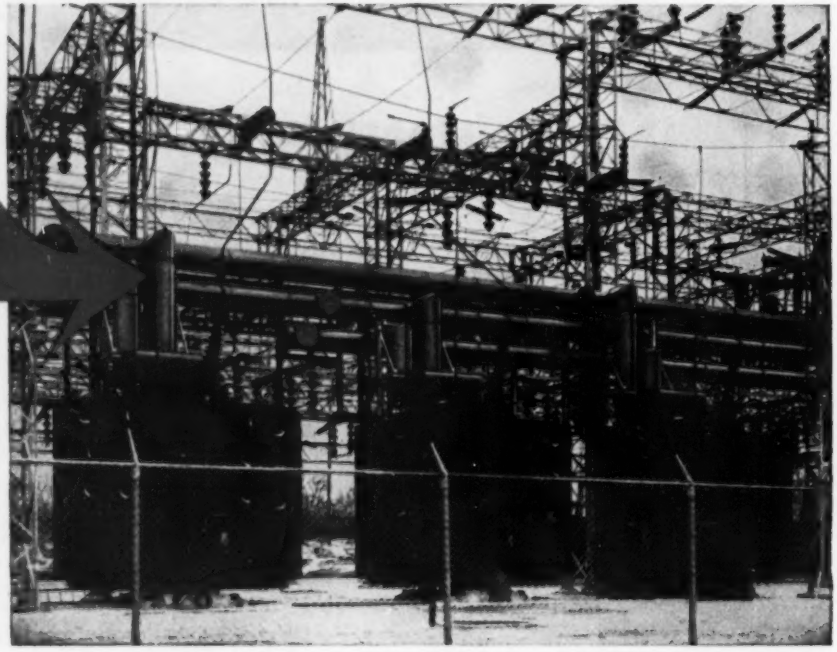
*Ask your Line Material Field Engineer to give you complete details.*

FARGO

Manufactured by
**FARGO MFG. COMPANY, INC.**
Poughkeepsie, N.Y.

Distributed by
**LINE MATERIAL COMPANY**
(A McGraw Electric Company Division)
Milwaukee, Wisconsin

# FIRST STEP
# TOWARD SERVICE CONTINUITY...

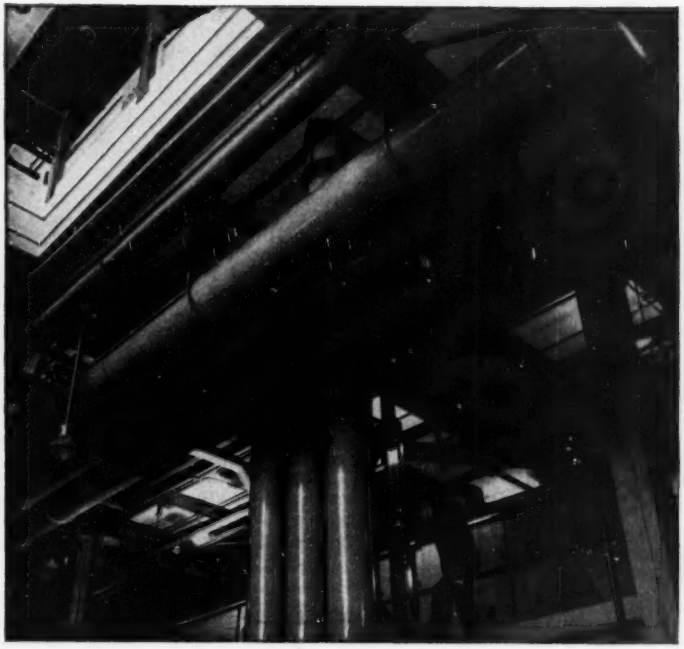


*Generator leads—*

These key links in power generation and distribution systems must have high dielectric and mechanical strength. I-T-E Isolated Phase Bus is designed and built to meet all the electrical and mechanical essentials.

*that satisfy your requirements*

I-T-E Isolated Phase Bus can be used indoors or outdoors—on long runs or short runs. It can be threaded through complicated mazes of piping and conduit. Connections to transformers and other auxiliary equipment are neat and easy.



## easy-to-order

Working from a simple, single line diagram of your circuit and building, I-T-E supplies finished drawings and a quotation for a complete bus.

*And the bus production capacity of I-T-E and its R&IE Equipment Division is sufficient to satisfy the requirements of all the generators now being produced in the United States.*

## easy-to-install

Readily adaptable to any building contour, I-T-E Isolated Phase Bus may be furnished in sections of three phase units, when required. It may also be delivered as packaged parts—to meet particular installation problems.

## proved in service

I-T-E Isolated Phase Bus has been transmitting the power from the largest generators since 1936. Over 24 conductor-miles in 213 installations are in service today.

For further information, write for Catalog Section 10004. I-T-E Circuit Breaker Company, 19th and Hamilton Streets, Philadelphia 30, Pennsylvania.

I-T-E

# ISOLATED PHASE BUS

**Power Switching Equipment:**
R&IE Equipment Division, Greensburg, Pa.

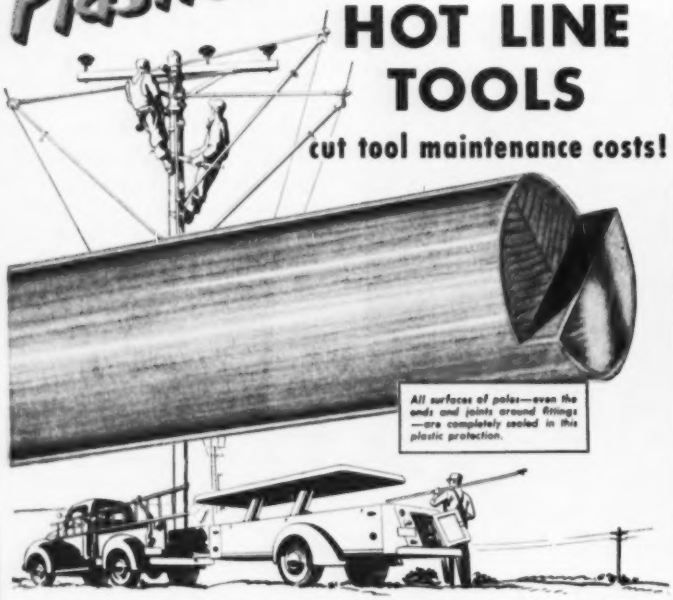
**Canadian Mfg. and Sales:**
Eastern Power Devices, Ltd., Toronto

**Export Sales:**
Philips Export Corp., N. Y., N. Y.

# CHANCE
MAPLAC*

## Plastic Protected HOT LINE TOOLS

cut tool maintenance costs!




Now, Chance lightweight, aluminum-fitted Hot Line Tools are protected with a new super-tough plastic finish called "Maplac"* that greatly reduces tool maintenance and helps to keep tools in safe working condition.

This new plastic protection has many plus features of real value to hot stick users:

**TOUGHNESS** to withstand any impact or abrasive action encountered in normal use.

**TRANSPARENCY** that permits initial inspection and periodic checks.

**MECHANICAL STRENGTH**–Chance "Maplac," being extremely tough, does not require sacrifice of pole size and strength to gain the necessary thickness. It adheres to the wood surface and reinforces the pole adding to the factor of safety.

**TEMPERATURE RESISTANCE**–retains its toughness under widely varying temperatures.

**ELECTRICAL RESISTIVITY**– exceeds the voltage withstand tests of the wood insulation (complete safety, however, depends on the moisture content of the wood–no plastic will completely prevent absorption of moisture vapor).

**MOISTURE RESISTANCE**–Chance "Maplac" retards the absorption of atmospheric vapor in high humidity and protects the wood from precipitation moisture (this does not mean that plastic covered poles are recommended for use in the rain–but that Chance "Maplac" greatly reduces moisture penetration.

**REPAIRABILITY**–may be repaired without heat or special tools if cut by a sharp blow.

All this at NO INCREASE IN PRICE! Specify Chance "Maplac" Plastic Protected Tools.

* TRADE NAME

A·B·CHANCE CO·
CENTRALIA, MISSOURI
SAN FRANCISCO, CALIF.

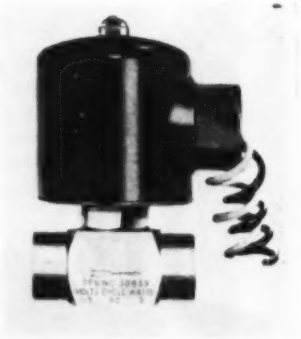

strength of approximately 1,000 v per mil thickness. Both are inert to fungus and can be machined; neither supports combustion. Unfilled, they are classified Class A insulating materials. With proper fillers they can be processed to meet Class B requirements.

**Minnesota Mining & Mfg Co, St Paul 6, Minn.**

## Color Lamps

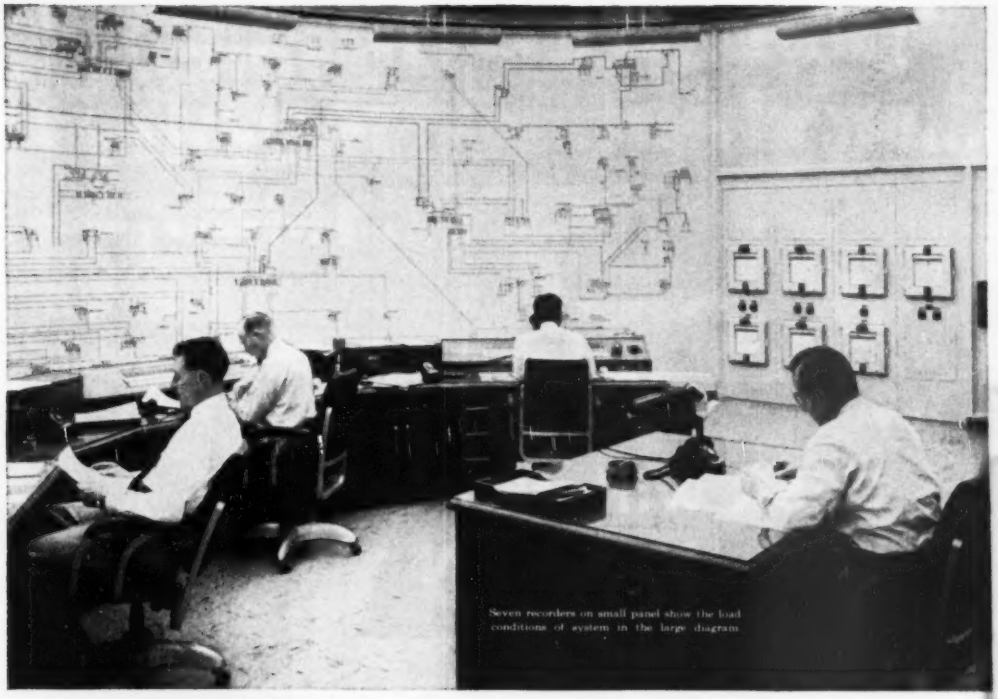
150-w R-40 bulb color spot and flood lamps provide wide or narrow beam pattern. Available with red, blue, green and yellow bowl. Designed for display, signal lights, outdoor general illuminations.

**Westinghouse Lamp Division, MacArthur Ave, Bloomfield, N. J.**



## Solenoid Valve

For air, oil, water, other noncorrosive liquids and gases. Capacity 78 gph on water, 1 ton Freon 12 on refrigerant. Working pressure to 300 psi, liquid lift to 130 psi, air and gases



Seven recorders on small panel show the load conditions of system in the large diagram

# 25 years of systematic development...

***reflected in industry-wide adoption of L&N Load-Frequency Control***

Interconnected operation of power systems has resulted in improved reliability, economical interchange of power, and greater operating flexibility. These advantages, which are so important in planning for future load growth, are possible because of two basic techniques which have evolved from years of operating experience:

1. the load dispatcher for each system is given immediate and complete information concerning load and generation conditions in that system.

2. each system absorbs as much of its own customer load changes as possible.

Leeds & Northrup system control achieves these two operating techniques because L&N progress has been "in phase" with changing utility operating requirements during the past 25 years. Speedomax Telemeters bring an almost instantaneous appraisal of system load facts to the load dispatcher's attention; L&N Load-Frequency Control automatically regulates the system's generating plants to maintain desired schedules of net power flow into or out of the system.

And L&N equipment is backed by field engineers who have extensive experience in power plant applications. Whether yours is a small utility, or a large one—interconnected or isolated—L&N equipment and engineering are ready to help you prepare for future load growth.

For details, write to 4938 Stenton Avenue, Philadelphia 44, Pa.

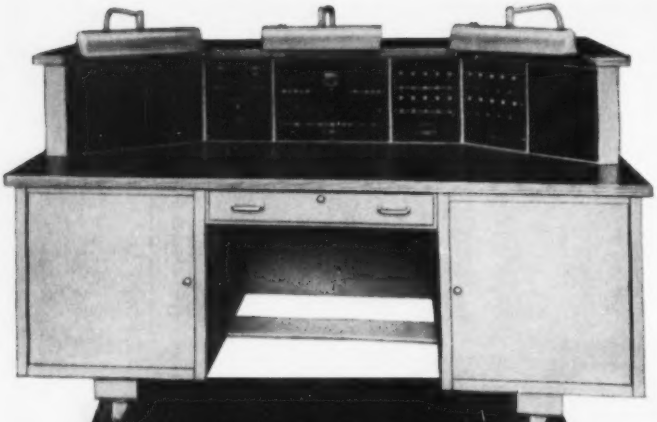
**CAREER OPPORTUNITIES AT L&N**

Expansion program of this long-established firm has many features to attract outstanding recent graduates in engineering and science. Opportunities are in sales field engineering, product and application engineering, research, advertising, market development. Widely-respected policies assure recognition of progress and achievement. Address Personnel Manager for preliminary interview at nearest of 17 L&N offices.

**LEEDS & NORTHRUP**

INSTRUMENTS · AUTOMATIC CONTROLS · FURNACES

Jrl Ad ND4-50-461(Ba)



# DESK with the BUILT-IN BRAIN

This is an Operator's Control Desk with a built-in Supervisory Annunciator and Control Switches. While not itself restricted, it is presently being used in top secret government work because it gives dependable controls without the danger of waste or disaster caused by human failure. AUTH is a specialist in the manufacture of such equipment — your most dependable and most experienced source for all types of SUPERVISORY ANNUNCIATORS. Use AUTH annunciators to start or stop operations, control speed, cycles, changes; use them for black-out controls, air-raid howlers, gate-controls, process indicators. They can be had on desks, built into cubicles or consoles, as fan plates or arranged for wall mounting.

***Write today** for complete descriptive literature, without obligation. Address: Auth Electric Company, Inc., 34-20 45th Street, Long Island City 1, New York*

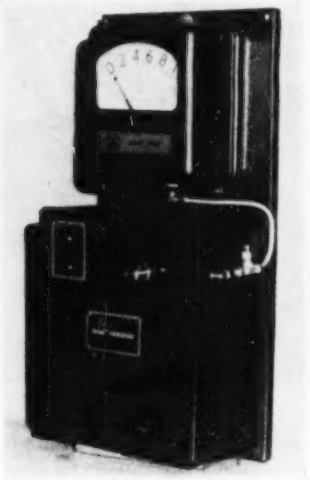
SINCE 1892 AUTH

FOREMOST IN THE DESIGN AND MANUFACTURE OF ELECTRICAL SIGNALING, COMMUNICATION AND PROTECTIVE EQUIPMENT.


250 psi, refrigerant 200 psi. Model 67.

Available for ⅜-in. female pipe or ½-in. O.D. tube sweat connections. For "bubble-tight" operation, valve is furnished with a synthetic resilient disk-type needle seating against a stainless steel orifice. For other applications, a stainless steel needle seats against a stainless steel valve seat. Entire plunger removable for cleaning.

**A-P Controls Corp, Milwaukee, Wis.**



## Over-fire Draft Control

Electronic sequence control is claimed to hold the breaching or stack damper closed when no heat or power is required, open damper wide in 60 sec when burner operation is called for, start burner control equipment when damper is wide open. The gas pilot is proved before the main oil or gas valve is opened.

In large burners high-low or modulating control is incorporated. After the main flame is proved, the damper modulates to maintain the pre-set draft.

**Bressler Engineering Service, Oregon, Ill.**

## Microwave System

For multiple channel voice, telemetering, supervisory and control functions. Operates over 940 to 960-Mc range. Type RCA CW-5B, for point-to-point communication over

(*Continued on page* 186)

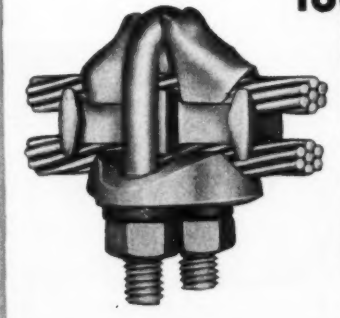
# aluminum connection problems?

## ✓ check these WEAVER

## aluminum hot line clamps

- ✓ Available for aluminum to aluminum or aluminum to copper connections at no difference in cost. All clamps cast of high strength, heat treated aluminum; main line tightening bolts and tap wire bolts cast of high strength aluminum silicon bronze.
- ✓ High strength bronze threaded insert is cast into the base of the clamp body so that bronze tightening bolt runs in bronze threads. There is no danger of Weaver Aluminum Hot Line Clamps freezing on the line.
- ✓ Bi-metal tap pad provides efficient copper tap wire connection. For aluminum to aluminum connections, plated tap bolt is used without bi-metal pad.
- ✓ Clamps will accommodate all main line sizes from #8ACSR to #1/0 ACSR over armor rods and tap wire sizes from #6 solid copper or #8ACSR to #2/0 stranded copper or #1/0 ACSR.

## loop dead end clamps



- ✓ One clamp accommodates all ACSR sizes from #6 to #1/0.
- ✓ All wire sizes are completely enclosed and firmly held by the clamp. Flanges on the spacer bar and design of the wire grooves prevent the strands from spreading apart on tightening so that there is no danger of loosening.
- ✓ Top casting and tightening plate are cast of high strength, heat treated aluminum alloy. Spacer bar is cast of special aluminum alloy which firmly grips the cable when the clamp is tightened.
- ✓ U Bolts fabricated of high strength steel, and nuts, lockwashers and U bolts are all hot dip galvanized.

WEAVER PRODUCTS ARE PRODUCED COMPLETELY IN OUR OWN MODERN INTEGRATED FOUNDRY AND FACTORY FACILITIES. VISIT US WHEN YOU ARE IN ST. LOUIS.

**J. A. WEAVER Company**

**2110 HOWARD ST. • ST. LOUIS 6, MO.**

**TELEPHONE CEntral 0881**

# No. 7- hook-operated . . .

★ *The Type H-U Hi-Voltage Hook-Operated Disconnecting Switch is a single-throw switch for vertical mounting in outdoor service.* It is available in capacities from 400 to 2,000 amperes, 7,500 to 115,000 volts.*

The Type H-U embodies design characteristics that guarantee *certain operation* anytime . . . under any condition . . . even after years of standing idle. Four features are outstanding:

**1—Independently hinged blades**
**2—Stainless steel contact springs**
**3—Silver-nickel contacts**
**4—Pry-off lock action**

Look over these advantages on the opposite page. They are in keeping with the traditional high quality and positive performance assured by all Hi-Voltage Switches . . . they are reasons for the continued superiority of Hi-Voltage in the air-switch field.

In addition to the hook-operated switch, Hi-Voltage offers these three other types:

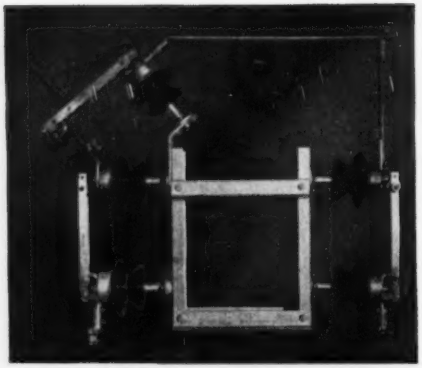
- **Rotating-Insulator, Vertical-Break Switches**
- **Center-Break Switches**
- **Side-Opening Switches**

These designs take care of practically all switch requirements for any station. For those installations requiring remote or automatic operation, there are also available either gas-operated or motor-operated mechanisms.

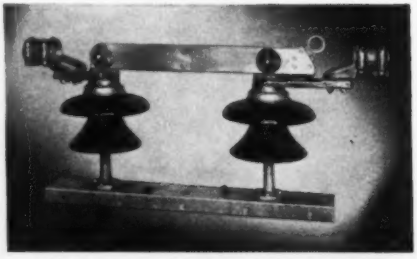
And for mounting switches along with the other substation equipment, Hi-Voltage supplies complete steel substation structures.

Ask your Joslyn Representative to give you the complete Hi-Voltage story.

**Also available for underhung mounting and in double-throw and transfer designs for either vertical or underhung mounting.*



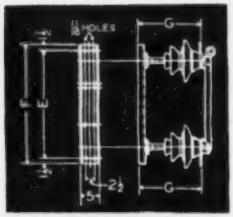
**Many special arrangements can be made with Hi-Voltage Hook Switches. Above is shown a compact, economical unit that can be mounted on a beam or girder. Two standard Type H-U's are combined with a by-pass switch that is operated by a lever hinged on the blade.**



**A 2000-ampere switch is shown here. Note its heavy-duty construction. Contact pressure is maintained and evenly distributed by six stainless steel compression springs at each end of the blade . . . still the best means of assuring correct contact pressures with no undue wear of the silver contacts.**

HI-VOLTAGE

# type H-U disconnecting switch



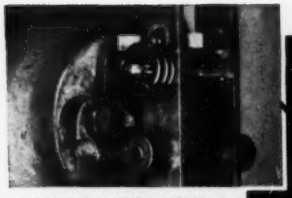

TYPE H-U HOOK-OPERATED SWITCH FOR VERTICAL MOUNTING

**TYPE H-U HOOK-OPERATED SWITCHES**

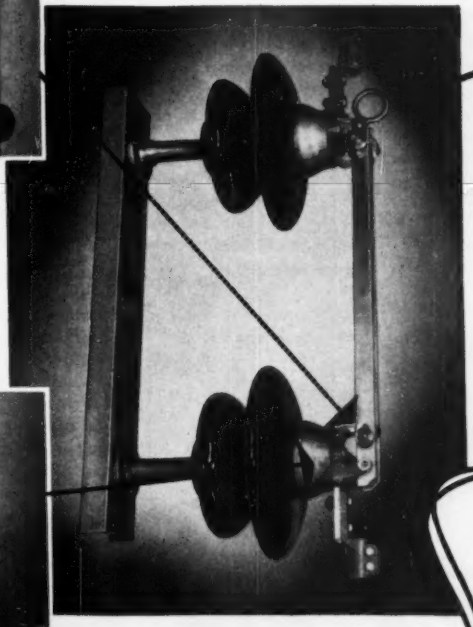
| VOLTAGE | DIMENSIONS IN INCHES | | |
|---|---|---|---|
| | E | F | G |
| 7,500 | 18 | 21 | 9⅝ |
| 15,000 | 21 | 24 | 12⅛ |
| 23,000 | 24 | 27 | 14⅛ |
| 34,500 | 30 | 33 | 17⅛ |
| 46,000 | 38 | 41 | 20¼ |
| 69,000 | 50 | 53 | 31¼ |
| 115,000 | As required | | 51¾ |

**Hi-Voltage SWITCHES ARE AVAILABLE**

from 200 to 3000 Amperes, 7500 to 161,000 Volts for upright, underhung or vertical mounting.

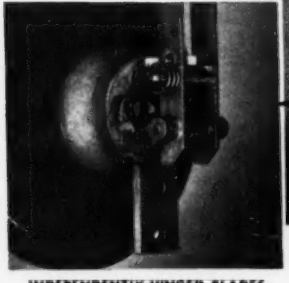


**STAINLESS STEEL CONTACT SPRINGS**—On all switch models, contact pressure is maintained by stainless steel compression springs of ageless flexibility. Moisture cannot rust them nor interfere with the maximum conductivity they develop.



**PRY-OFF LOCK ACTION** assures easy opening under ice conditions and when switch location necessitates a pull with the switch stick almost parallel to the blade.

**SILVER-NICKEL CONTACTS** welded to copper on 600 to 2,000-ampere switches . . . your guarantee of permanent conductivity and non-galling, corrosion-proof performance.



**INDEPENDENTLY HINGED BLADES** operate entirely independent of the hinge-and contact. Thus, misalignment which sometimes results from installation can never affect their smooth operation and positive conductivity.

**ALSO AVAILABLE!**

- Grounding Switches
- Manual and Automatic Control Mechanisms
- Mechanical Interlocks
- Hi-Voltage Fuses
- Cross-arms and Mounting Frames
- And all customary accessories


**EQUIPMENT COMPANY**

4000 EAST 116th STREET • CLEVELAND 5, OHIO

COLLYER ALUMINUM CABLE

THIS LIGHTWEIGHT PACKS A WHALE OF A **WALLOP!**

Lighter in weight, adaptable to longer spans, more readily available than copper, more economical in most constructions than copper for equivalent current carrying capacity — these are the important advantages of Collyer Aluminum Cable.

**Neutral-Supported Service Drop Cables**

Aluminum conductors — rubber, neoprene, or polyethylene covered.

Bare neutral messenger — of solid or stranded aluminum — or ACSR for greater strength.

**Line Wire**

Aluminum or ACSR Conductors — neoprene or polyethylene covered.

•

For samples, prices, and recommendations, write Collyer Insulated Wire Company, 245 Roosevelt Avenue, Pawtucket, Rhode Island.

CHOOSE *Collyer* ALUMINUM CABLE


distances to 300 mi, with repeater stations at approximately 25-mi intervals. Five voice, one service, channel may operate simultaneously. 9 to 18 control circuits may be substituted for each voice channel. Designed for unattended operation, the complete two-way repeater can be mounted in a single 89-in cabinet or rack, weighing about 300 lb.

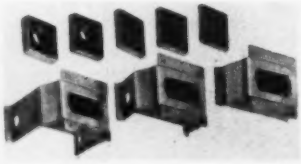
Transmitter power output 2w, requirement 105/115/125v 60 cps ac, 450w. Receiver power requirement 105/115/125v 60 cps ac, 100 w.

**RCA Victor, Camden, N. J.**

## Working Platform

Portable one-piece welded steel platform measures 46 in. high closed, extends 8½ ft for 15-ft working height. Base area 27x40 in. Designed for overhead service and maintenance.

**Atlas Industrial Corp, 849-39th St, Brooklyn, N. Y.**



## Adjustable Insert

For use in concrete. Elongated hole in face of insert and offset hole in nut

(*Continued on page* 190)

# Here's why your plant needs a GAI-TRONICS Power Plant Communication System

## ...custom-built by Power Plant Design-Engineers!

**EFFICIENCY!** *Everyday-operations* run *smoother* because a modern GAI-TRONICS System is *fast* and *sure*. Critical manpower is used most effectively. Executives, operators, departments, and maintenance men are called by *name* instead of by slow, confusing code calls. Two-way or group conversations take place over special telephone handsets. These are designed for noise-free operation in *extremely high noise* areas even without acoustic booths! GAI-TRONICS has proved itself in the plants of many electric utilities throughout the United States and abroad.

**EMERGENCY!** *When trouble occurs*, a GAI-TRONICS System alerts and coordinates all affected areas *by voice* at once—even though the system is otherwise in operation. All areas can hear all sides of emergency instructions, if necessary, or telephone-type privacy may be had at the flick of a switch! Maintenance men can be located and dispatched to the job without delay.

**ECONOMY!** *A* GAI-TRONICS *System* is surprisingly low-priced because it is designed, by men thoroughly acquainted with power plant requirements, to provide *all* internal communication facilities in *one* system! By preventing damage to costly plant equipment and keeping your plant "on-the-line" during an emergency, a GAI-TRONICS System may pay for itself in minutes! *Fast* and *sure* GAI-TRONICS communication minimizes accidents, misunderstood orders, improves labor relations, and lowers production costs.

**FREE** . . . a booklet or a demonstration! POWER PLANT COMMUNICATION SYSTEMS is an informative booklet showing GAI-TRONICS at work under the most difficult sound conditions. Read it before deciding on communications for your plant. It will save you money! If you should like a demonstration . . . we will bring a portable GAI-TRONICS unit to your plant and prove its worth under any noise conditions! Write today!

GAI-TRONICS CORPORATION

GAI

# Utilize the flexibility of

## *. . . . . for fast, accurate recording*

### *Check this Flexibility*

√ *Variety of circuits . . . potentiometer; Wheatstone, Kelvin and impedance bridge . . . for use with wide selection of sensing elements, including thermal converter illustrated on opposite page.*

√ *Variety of built-in switches for audible or visual alarms and signals.*

√ *Variety of chart speeds, from ½" to 120" per hour.*

√ *Variety of single-point and multi-point models, in choice of printing speeds.*

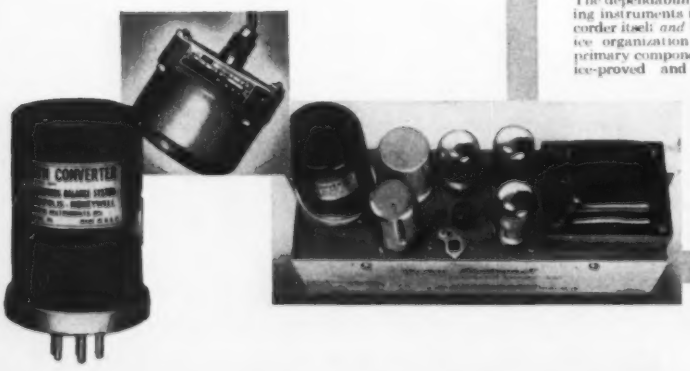
THE flexibility of the entire line of Brown instruments makes available a variety of combinations well qualified to fill the measuring, recording and signalling requirements of any power plant. Use of standard, interchangeable components simplifies maintenance, reduces parts-stocking problems.

Thanks to this flexibility, the *ElectroniK* Recorder is applicable to measuring temperature, pressure, flow, speed, pH, conductivity, power, current . . . the *same basic instrument for all*, with changes only in measuring circuit and sensing element.

Check the flexibility features . . . then call in our local engineering representative for a discussion of how they can add to your operating efficiency.

### *Dependability, Too!*

The dependability you demand from your recording instruments is insured by the *ElectroniK* Recorder itself; *and* by *Honeywell's nation wide* service organization . . . by the dependability of primary components which are life-tested, service-proved and designed for minimum, easy maintenance. You can appreciate at a glance the ruggedness of the high-torque balancing motor, the hermetically sealed converter, the simplified *continuous-balance* amplifier . . . as well as the minimum of moving parts and the obvious freedom from adverse effects of dust and atmospheric humidity.



# *ElectroniK* Potentiometers

## *of megawatts and megavars*

### THE *ElectroniK* POWER RECORDER

***Important Features:***

- *Continuous Balance measuring system with electronic non-cyclic balancing, proved in thousands of industrial installations.*
- *Selection of ranges for generator output, station total generation, and tie line interchange.*
- *11-inch wide scale, readable at a distance . . . open, legible chart for detailed recording.*

WHEREVER continuous measurement and recording of electrical power are needed, the *ElectroniK* Recorder meets every power engineer's specifications. Supplied for any desired megawatt range, the instrument works with a thermal converter connected to standard instrument transformers. By adding a phasing transformer to the detecting circuit, it is readily adapted to measurement of reactive or "wattless" power.

Operating men like the *ElectroniK* Recorder's speed and accuracy, its 11-inch wide scale and chart which spreads load curves out in easily readable detail.

Maintenance men like the *ElectroniK* Recorder's ruggedness and simplicity, its small number of moving parts, its complete freedom from delicate mechanical linkages, its easily-serviced unit construction.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4568 Wayne Ave., Phila. 44, Pa. Service facilities available in more than 55 cities in the United States.

MINNEAPOLIS **Honeywell**

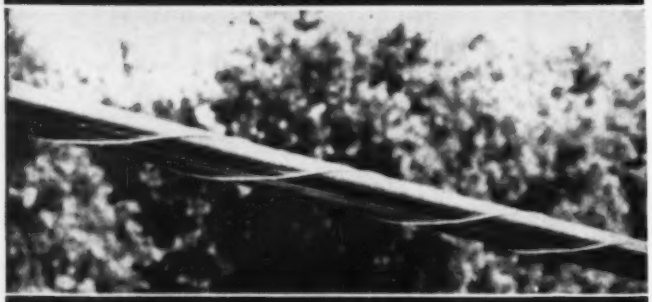
BROWN INSTRUMENTS

*First in Controls*

● *Important Reference Data*

WRITE FOR DATA SHEET NO. 9.1-3...CATALOG 90-2, "SUPERVISORY INSTRUMENTS FOR POWER GENERATION."

# SPIN CABLE LIKE THIS . . .



## THROUGH TREE-CONGESTED AREAS AT MUCH LESS COST . . .

You can save man-hours of wood-cutting and customer complaints when you spin cable through tree-congested areas. What is more, spun cable costs much less to install than pre-assembled cable. Spun cable is so compact that it saves valuable space wherever congestion is a problem.

You save splices and installation labor, because light weight single conductor cables may be spun in lengths three times as long as pre-assembled cables.

You reduce your cable inventories, because 1/c, 2/c and 3/c cables can be spun in the field as required.

Add to these benefits the extra margin of protection against storm damage . . . and you readily understand why there is a marked trend to cable spinning in the power field.

**with NEALE Model "K"**

## HOW IT WORKS

Drum rotates when its two friction drive wheels respond to pulling of wire. Drum revolves once when 13' of wire is pulled — regardless of condition of strand. Drum carries two spools of wire, each spirals 13' giving support every 6½'. Magnesium castings used wherever possible for lightness and strength. Weight: only 36 lbs. Overall length: 18½".

THE WORLD IS SPINNING—TOO

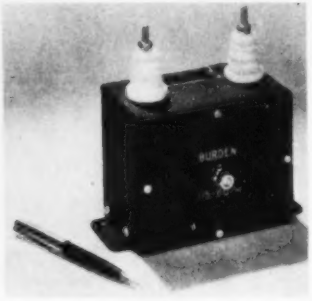
**Cable Spinning Equipment Co.**

3100 TOPEKA AVE. TOPEKA, KANSAS


make it possible for nut to be put on bolt before being placed in insert.

Inserts made of heavy gauge steel, said to support 1,500-2,400-lb load. Available for bolt sizes ¼ to ¾ in.

**Super-Grip Anchor Bolt Co Inc, Philadelphia 40, Pa.**

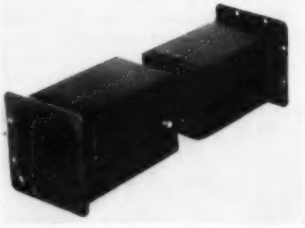



## Measuring Reactor

A dc voltage-measuring reactor provides increased safety by insulating the measuring circuit from the power source. It consists of a saturable core reactor with a dc winding, two ac windings and range resistors. Accuracy is said to be 0.5% full scale.

The dc voltage saturates the core and the ac windings, operating from a separate 115v, 60-cycle power supply, furnish a voltage proportional to the degree of saturation. This ac voltage is rectified by a selenium bridge rectifier. The unit measures 6½ x 6½ x 4 in. and weighs 2 lb 10 oz.

**General Electric Co, Schenectady 5, N. Y.**



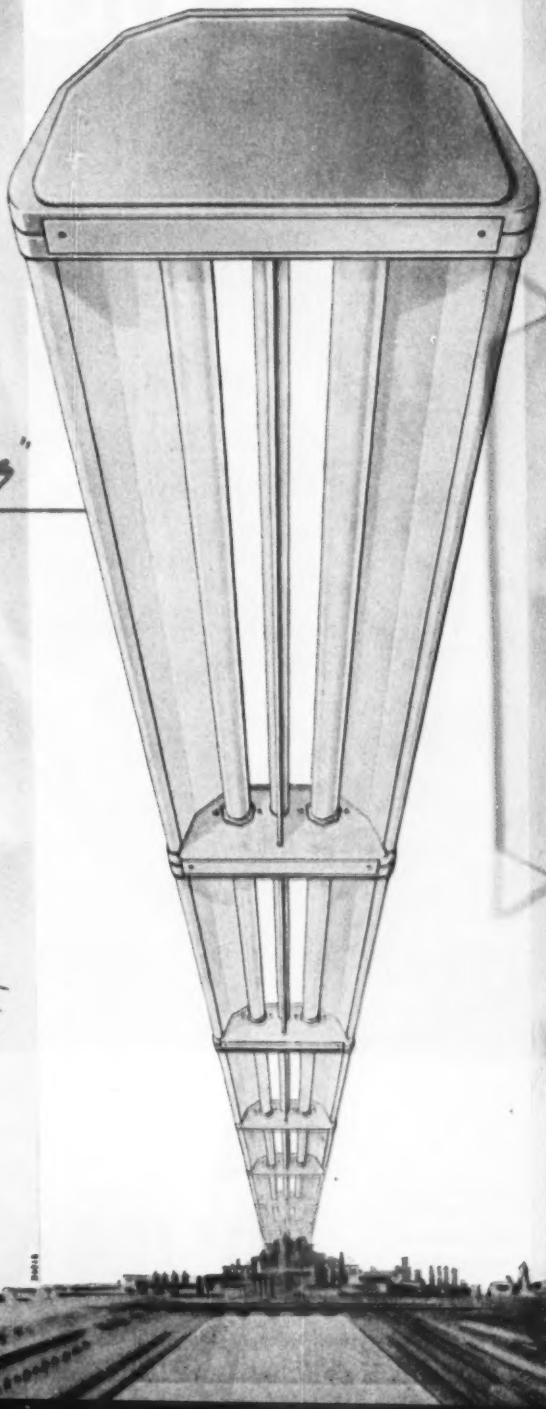
## Telescope Fittings

Furnished for 2½, 4 or 6-in wireways, adjustable in length from 8 to 12 in. 16 gauge steel painted for rust resistance. Set screws lock the fittings in place when they have been ad-

(*Continued on page* 194)

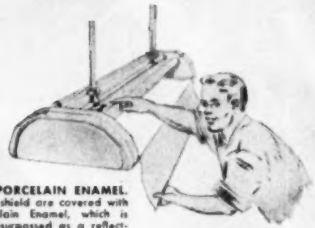
## now, a new high in seeing comfort

## through sensationally-increased UPWARD LIGHT...



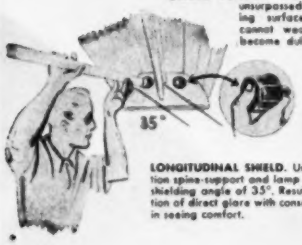
Now, approximately ¼ of light is directed UPWARD through a completely new, precedent-shattering concept of lighting unit design! The new Benjamin "Task-Master" is the modern solution to the brightness ratio problem. By combining greater upward flow of light with a new high of 35° in lamp shielding, "Task-Master" doubles, even triples, present standards for industrial seeing comfort. In addition to sensationally-increased UPWARD light and lamp shielding, "Task-Master" features revolutionary new, easier methods of installation and maintenance, such as those illustrated below. Send for FREE "Task-Master" Bulletin, giving further details. Write for Bulletin AD 5906. Benjamin Electric Mfg. Co., Dept. K, Des Plaines, Illinois.

## BENJAMIN "Task Master"



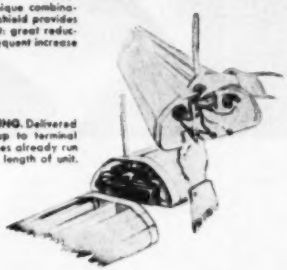
**DETACHABLE REFLECTORS** are hinged to make possible easier, more thorough cleaning right on the fixture. They may also be detached and cleaned away from the unit. Available with sliding hangers, as shown.

**"LIFE-TIME" PORCELAIN ENAMEL.** Reflectors and shield are covered with genuine Porcelain Enamel, which is unsurpassed as a reflecting surface because it cannot wear, scratch or become dull.




**"SPRINGLOX" LAMPHOLDERS** are standard equipment. These rugged, all-metal, lifetime lampholders facilitate lamping and relamping through patented spring design.

**LONGITUDINAL SHIELD.** Unique combination spine-support and lamp shield provides shielding angle of 35°. Result: great reduction of direct glare with consequent increase in seeing comfort.



**PRE-WIRED—NO WIRE SPLICING.** Delivered with all connections made up to terminal block. Branch-circuit wire comes already run through spine support, entire length of unit.

**SPECIAL "HOOK-UP" DESIGN** makes it possible for the installer to temporarily hang one unit on another while connecting the jumper wires to opposite terminal blocks.

# SAVES SPACE!

SAFETY m.i. WIRING*
with fittings to connect
to standard boxes
and equipment

*Exclusively A General Cable Product



SIZES
16 TO 4/0 A.W.G.

SIZES
16 TO 4 A.W.G.

SIZES
16 TO 4 A.W.G.

SIZES
16 TO 6 A.W.G.

SIZES
16 TO 10 A.W.G.

SAFETY m.i. WIRING SYSTEM PROVIDES ADVANTAGES NEVER BEFORE ACHIEVED!

# SAFETY m.i. WIRING

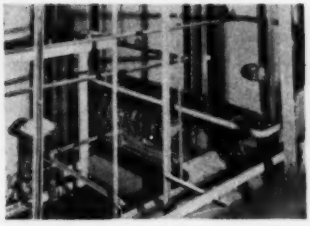
**...with smaller diameter, fits readily into small or restricted spaces.**

A Safety mineral insulated Wiring circuit can be installed around bends, corners, or on vertical risers without the use of additional accessories. As machine wiring it can be trained in tight quarters... too tight for any wire of larger diameter.

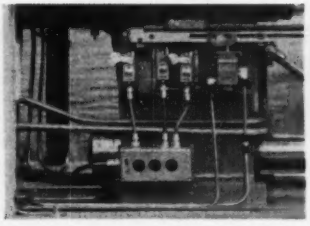
Yes, Safety m.i. Wiring, enclosed in its integral conduit-sheath, is a definite space saver in addition to all of its other special advantages. Space bottlenecks are eliminated and installations are made quickly and economically.

So unusual are the advantages of this new General Cable product, and so important are they to you, that you will want to know more about it. For full details, write your nearest General Cable office.

"More Power to You"®



The space saving advantages made possible by the small outside diameter of all Safety m.i. Wiring are well demonstrated by this control board installation in a large chemical plant.



Here is a close-up of a Loewy-Hydropress machine using Safety m.i. Wiring. Note the smooth surface — so easy to keep clean. Its small diameter saves space and insures neatness.

## GENERAL CABLE
CORPORATION

EXECUTIVE OFFICES: 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK  SALES OFFICES IN PRINCIPAL CITIES OF THE UNITED STATES

To give you the "INSIDE STORY" in a hurry...Control Corporation's
Super-Trol* is MAINTENANCE ENGINEERED
more reliable
easier to understand
easier to check
less costly
*Super-Trol—the Control Corporation system of remote, supervisory control.

**Why you can do the job better with Super-Trol equipment:**

- Swinging panels more accessible for inspection . . . repairs
- Simplicity of circuits plus plug-mounted relays.
- Swinging relay panels mean faster, easier replacement.

Industry Forecast
for Supervisory Control:

**LOWER OPERATING COSTS USING CONTROL CORPORATION EQUIPMENT**

Super-Trol, Control Corporation's modern method of remote supervisory control, offers reliability and speed *plus* lower operating costs. Super-Trol maintenance costs often have been proven lower in many types of installations.

*Write today* for Bulletin AA-2. Let us show you how Super-Trol can be utilized to lower *your* operation and maintenance costs.

**CONTROL CORPORATION**
719 CENTRAL AVE. N.E. MINNEAPOLIS 14, MINN.
• Super-Trol • Peak-Trol • Telemetering • Battery Chargers • Carrier Current •


justed to the desired length. Bolt holes pierced through the flanges eliminate drilling before installation.

**Keystone Mfg Co, Centerline, Mich.**

## Luminaire

Bare lamp luminaire series, type BB, for general lighting, holds two 40-w standard or two 38-w, 58-w or 75-w slimline fluorescents. Equipped with lead-bag ballast, swivel socket assembly, mounting connector for use in rows.

**Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.**

## MORE NEW PRODUCTS

about which you should know

Bauer & Black, 222 West Adams St, Chicago 6, Ill, developed a type I grade A pressure sensitive **tape** which meets JAN-P-127 specifications for a moisture vapor barrier. Called Polyken No. 329, the tape has the qualities of tack, adhesion and tensile strength required in the government specification. . . . Minneapolis-Honeywell Regulator Co, Wayne and Roberts Ave, Philadelphia 44, Pa, developed **miniature indicators** for liquid level and valve position, using colored metal tapes to simulate liquid level. The indicators occupy minimum panel-board space.

General Electric Co, Schenectady 5, N. Y., produces a rotating-type **limit switch** for use where reversing operation is coordinated with the number of shaft revolutions. Switch operates from 4-110 turns, with 5 turns overtravel. . . . Ingersoll-Rand Co, 11 Broadway, New York 4, N. Y., has an advanced design of its single-stage **double-suction pumps,** Classes DMV and DHV, in 3-6 in sizes; capacities to 2100 gpm and pressures to 150 psi. New casting design makes three spare parts kits service all eight pumps in the line.

# CURTAINS for OXIDATION and DEPOSITS

## in turbine lubricating systems...

# GULF'S famous ONE-TWO

**1 FLUSH WITH GULF TURBINE FLUSHING OIL**

Removes grease-type slushing compounds. Carries away harmful abrasives. Protects against rust.

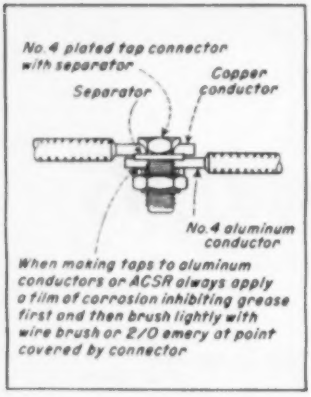
**2 FILL WITH GULFCREST OIL**

Maintains low neutralization number. Lasts indefinitely. Prevents rust on all oil-bathed surfaces.

Ask a Gulf Sales Engineer for additional information. Write, wire, or phone today. Gulf Oil Corporation · Gulf Refining Company, Pittsburgh 30, Pennsylvania.

GULF INDUSTRIAL LUBRICATION

# LETTERS TO THE EDITOR


No. 4 plated tap connector with separator
Separator
Copper conductor
No. 4 aluminum conductor
When making taps to aluminum conductors or ACSR always apply a film of corrosion inhibiting grease first and then brush lightly with wire brush or 2/0 emery at point covered by connector

## Copper on the Bottom

To the Editor:

I offer a correction to Engineering Reference Sheet, No. 52-15, published on page 110 in the July 28 issue.

In Fig 2 it is to be noted that the service tap connector is shown with the copper cable fitted uppermost. When installing this connector the aluminum cable should always be placed in the upper position. This prevents the soluble copper salts from forming an electrolytic path which will ultimately result in the destruction of the aluminum conductor.

R. G. Wolff
1340 Ouimet Street
Montreal, Quebec

• The editors are obliged to reader Wolff for offering this correction.

## Hot About House Heating

To the Editor:

I have been waiting patiently for a follow-up to the very fine editorial on electric home heating. I have read Viewpoints 1 and 2 in the August 25 issue of Electrical World.

When will the electric utility industry wake up? The general public will buy what it wants and pay a premium for comfort, convenience, safety, pleasure, distinction, etc, etc. As you so truly laid it out; people will pay $500 for an automatic washer and dryer in contrast to $10 or less for a couple of tubs, a wash board, and a piece of rope; $1200 and up for a central heating system in contrast to $40 or less for a coal stove; several hundred dollars for a complete electric lighting system as contrasted with a few dollars for a couple of kerosene lamps; etc.

Load factor! Load factor indeed. The only business I know of offhand that has a 100% load factor is the taxing business. TVA isn't worrying about home heating load factor. Neither is Bonneville. A word to the wise, they say, is sufficient but the utility people seem awfully slow in picking up the hint.

Why can't the utility people assume their proper function which is to serve the public? And keep the detail problems to themselves. Furthermore, when will they learn to train their sales people to sell and not explain.

Name Withheld

• On request, but reluctantly, the editors withhold the identity of the writer of this outspoken letter.

## Engineering Personnel

To the Editor:

I want to congratulate Indianapolis Power & Light Co for its direct approach to the much publicized problem of engineering personnel shortage. I refer to the article "Utility Program to Get Engineers" in the July 7 issue (p. 14) of Electrical World.

Unless the situation has changed materially within the last five years, I believe the principal reason engineers today abjure all faith in a utility career is because of the reluctance of these companies to delegate responsibility to qualified individuals. Too many graduates are no more than engineering clerks during their tenure while they await a vacancy for advancement. Having been a utility employee and having diversified contacts with "five-year" utility engineers working on design, I know this to be true.

There are exceptions, however, in cases where engineers have been assigned to two main groups, the Operations Department and the Testing and Development Department. In these groups the work is diversified, there is action, and unusual problems occur continually. This is fertile territory for the young engineer to exploit. The fact that certain conditions demand "around the clock" service in these groups immediately puts a measure of responsibility upon those in charge. Initiative, prompt decisions, and creative imagination are required for this type of work. Put a young engineer into these groups, and he will be happy because he's learning and serving by being active.

The recent engineering graduate does not consider routine engineering and design as a service. To him it's a chore which he only tolerates until he finds (what he considers) something better.

K. B. Hoffman
Vice President
McConathy, Hoffman & Associates, Inc
150 Broadway
New York 38, N. Y.

## Ungrounded Better?

To the Editor:

On page 74 of the Aug. 24 issue under "Technical Notes" the following statement appears:

"Grounded distribution systems are more vulnerable to lightning and wind than the ungrounded. Ratio of faults more than 2/1."

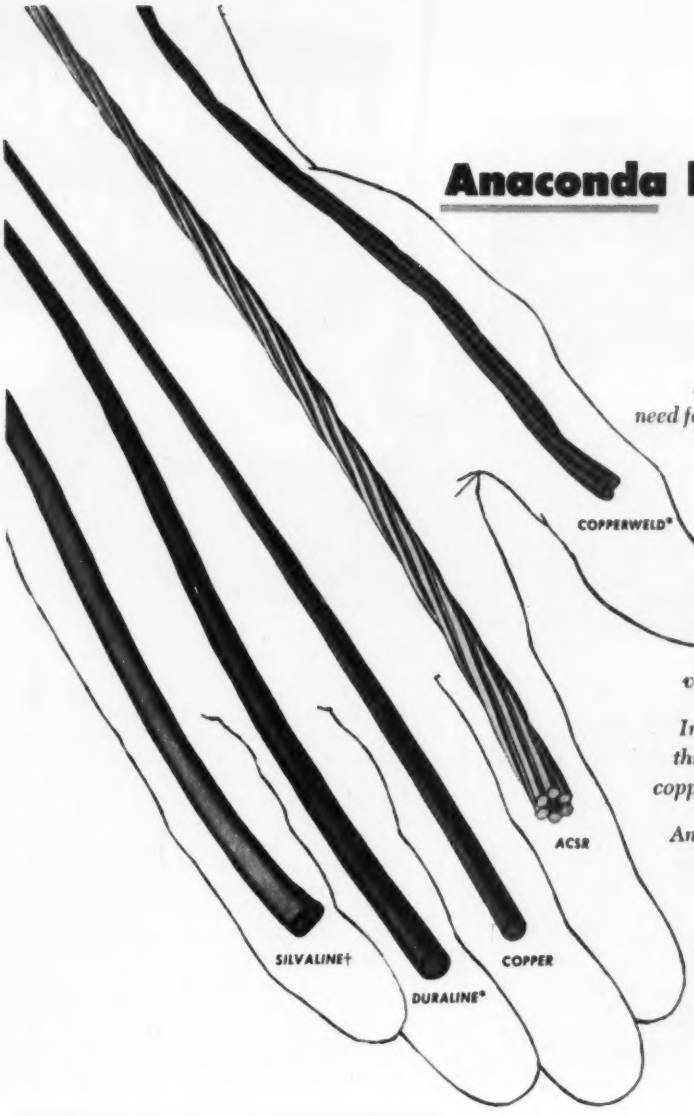
I would like to know the basis for making the statement, the source of experience leading to the conclusion, and other related information you might care to give me.

Most of the operating companies I am familiar with use grounded distribution primaries exclusively, and we do know that their operating records are very good but have nothing to compare those records with now. We do know that in the past the records of ungrounded circuits on the same systems were by no means as good as the records of the present grounded circuits. We would like to know as much as possible about any facts leading to the opposite conclusion.

Paul G. Whitmore
General Engineer
Ebasco Services Inc
2 Rector Street
New York 6, N. Y.

• Source was the discussion which followed a report on the progress of the joint AIEE-EEI study of coordination of construction and protection of distribution circuits. The report was made at the EEI Transmission and Distribution Committee meeting last October at Rochester.

# Anaconda lends a hand



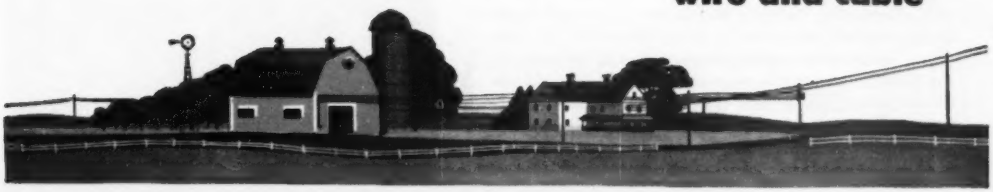

*Anaconda understands the vital need for power in rural areas. It recognizes that electric power has enabled the farmer to increase his farm production . . . has relieved him from necessary but time-consuming manual labor . . . has given him free time to devote to his home and community.*

*In rural installations, power flows through* ANACONDA *Conductors of copper, aluminum and Copperweld.*

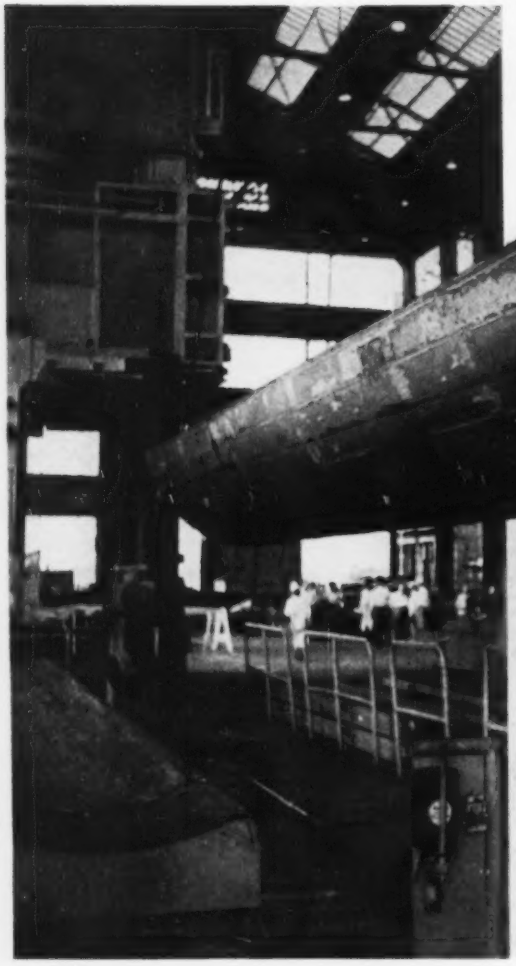
*Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

®Reg. U.S. Pat. Off. †Trademark

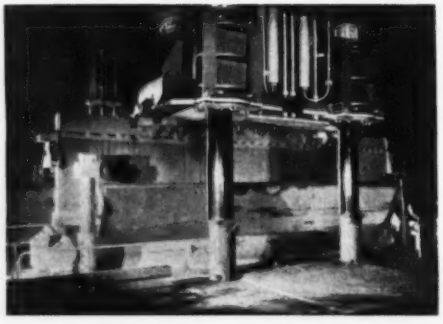
**the right cable for the job** **ANACONDA®** **wire and cable**



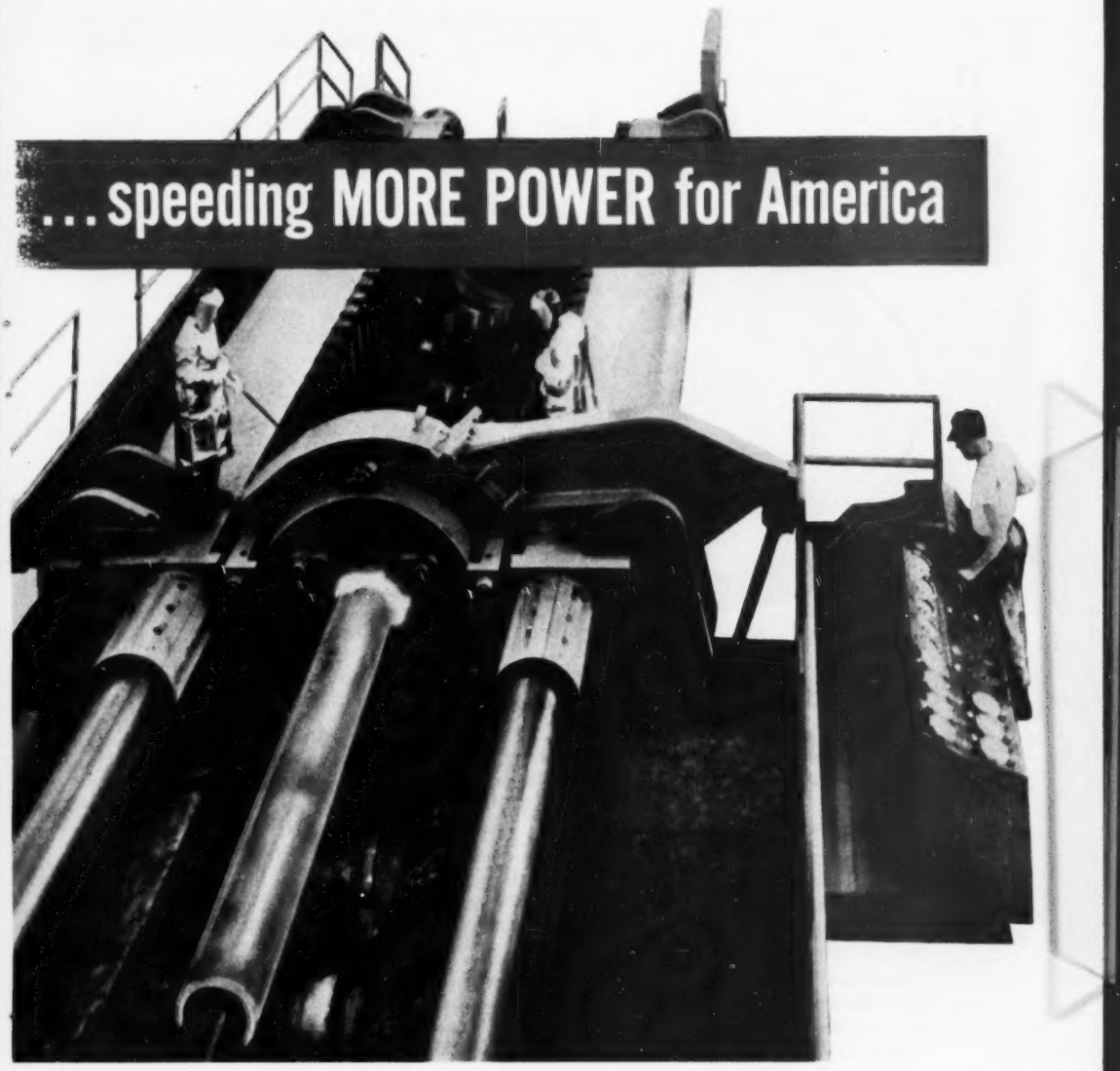
# BIG "NEWS" at B&W



This mammoth draw bench installed by Babcock & Wilcox introduces into America a unique method for faster forming of headers and other seamless hollow forgings for the high pressure and temperature conditions in modern steam generating units. This method uses less steel, is quicker and more flexible than previous procedures . . . heavy-wall piping and hollow boiler parts up to 35 inches outside diameter with 4½-inch walls and 22 feet long are forged with great speed.



Huge steel plates 42 feet long are formed into sections of massive boiler drums on a new press installed by Babcock & Wilcox. Largest ever built for this purpose, the press is speeding fabrication of power plant boilers by considerably reducing total plate bending time and permitting use of fewer and larger boiler drum sections, thus eliminating welding and X-raying of additional seams required when smaller plates are used. The new press, designed and under construction in advance of the electric companies' record power expansion, bends thicker boiler drum plate than does any other equipment now in operation, and enables B&W to build steam generating units for the highest pressure and temperature conditions that may be anticipated.




Highlighting a multi-million dollar expansion program at Babcock & Wilcox are two new giant machines to speed production of steam generating equipment for America's electric companies. Along with other new production facilities, more trained personnel, and three additional plants, these new machines are geared to forecasts of, and B&W's faith in, power's future.

BABCOCK & WILCOX

G-578 T

# for true economy in street light control

THE FISHER-PIERCE PHOTOELECTRIC CONTROL

- LOW INITIAL COST
- LOW INSTALLATION COST
- LOW MAINTENANCE COST

The *cost* of control of street lighting includes more than just the price of the control itself. Cost of installation is another major factor. Maintenance costs, if too great, can overcome all other economies.

The F-P Series 63300B Control combines *all three* elements of economy. No control of similar specifications has as low a purchase price. None requires fewer man hours for installation. No other control has equalled the F-P record for maintenance economy.

Fisher-Pierce is able to provide this economy in street lighting control because of its years of experience and its extensive engineering organization. Fisher-Pierce Controls have been proven by the experience of over 700 utilities now using more than 35,000 Fisher-Pierce units.

If you are considering adding to or modernizing your street lighting, be sure to investigate the possibilities of Fisher-Pierce photoelectric controls.

Write for Bulletin 63300B.

**The FISHER-PIERCE CO., Inc.**
82 Pearl St., So. Braintree, Boston 85, Mass.

EXPORT: PHILIPS EXPORT CORP. 100 E. 42nd STREET NEW YORK 17, N.Y.

IN CANADA: NORTHERN ELECTRIC CO., Ltd.


## WHAT THEY'RE SAYING

### At Industry Meetings

### Transformer Oils

**ANDREW S. MORROW,** staff engineer, lubricants dept, Shell Oil Co, before the Annual Convention of the Association of Iron and Steel Engineers, at Cleveland, Ohio.

Increased power demands prevalent throughout the United States have thrown a greater burden on all utility equipment. Of particular significance, transformers of all types have had to operate at higher loadings with the result that oil temperatures have been elevated materially. This considerably reduces the transformer's oil life.

Oil stability can be improved by incorporating a satisfactory oxidation inhibitor in a carefully selected transformer oil base stock. An inhibited transformer oil requires careful refining and treating techniques to obtain maximum inhibitor susceptibility. It must not have any adverse affect on the electrical properties of the base oil or on the transformers other components as well as being non-toxic and stable in the presence of ultra violet light.

A final analysis of the improved service performance of units filled with an inhibited oil will not be available for years. However, from the data that has already been accumulated, it appears the user will realize many definite economic and operational advantages.

### Air Filters

**FRED C. REUTENAUER,** design engineer, Elliot Co, before the Annual Convention of the Association of Iron and Steel Engineers, at Cleveland, Ohio.

In cooling systems of electric rotating equipment the cooling air is usually drawn wholly or in part from outdoors. Due to the fact that this air outside contains impurities and, especially in the vicinity of industrial plants, air filters must be employed in order to protect machinery and reduce maintenance.

Air volume, allowable pressure drop, dust concentration, degree of cleanliness needed, space available and type of maintenance wanted are some of the many items to be considered when a filter is to be used. The proper choice must be made between dry filtration,

# Guy transmission lines *three times stronger at half the cost* with CHANCE anchors!

You can cut line construction costs and do a *faster,* more efficient job of anchoring by using CHANCE Anchors for transmission line guying.

*Here are FACTS* . . . cost comparison figures on an actual installation prove that Chance Cross Plate Anchors were installed in only 2 man hours, while it took 8⅓ man hours to install a log anchor in the same terrain! The cost of materials used was approximately the same for each type of anchor and rod—but only one hole was drilled for the Chance Anchor, while a trench was necessary for the log.

Chance Anchors can withstand much greater strain for longer periods of time than treated log anchors. Laboratory tests on a Chance X-24 Cross Plate Anchor proved it capable of withstanding a pull of 70,000 lbs. for an indefinite period of time with only slight bending, while a creosoted log split under a 20,000 lb. pull in a matter of hours.

The Chance Cross-Plate can be installed in slanted or vertical machine bored holes in any kind of soil. It compares in cost with an average 4 foot treated log.

Other Chance Anchors suitable for transmission line guying are: The Never-Creep — that pulls entirely against undisturbed earth . . . The Steel Cone Anchor —ideal for rocky soil . . . and the Chance 8-way Expanding Anchor — that gives you two four-way anchors in one.

*You know it's RIGHT when you specify CHANCE*

ABC INDUSTRIES

**A·B·CHANCE CO·**

CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA

ANCHORS • GUYING FIXTURES • LINE CONSTRUCTION TOOLS • CONDUCTOR CLAMPS
GROUNDING EQUIPMENT • HOT LINE TOOLS • HIGH VOLTAGE SWITCHES • CUTOUTS

## *FIND OUT WHY!*

It's wise to use Chance Anchors instead of "dead-man" logs or slugs. Write today for test records and actual cost comparisons. We'll send you reasons why your next transmission line should be guyed the stronger, low-cost way — with CHANCE Anchors.

C52-13

# NOW...Wagner Form W offer all these features...

**Preset Line To Arrester Isolating Gap**

Wagner's new high voltage bushing and arrester assembly occupies minimum tank space, provides easier, safer permanent transformer connections with arresters isolated from the line.

When you choose Wagner Transformers—you get the benefit of improved design . . . better performance . . . longer life. Then, too, Wagner has a nationwide organization to provide fast, convenient service, with branches in 32 principal cities. Bulletins TU-180, TU-181 give complete information on Wagner Transformers.

Type HEB-1 Protected Transformer shown

Wagner Electric Corporation EST. 1891

WAGNER ELECTRIC CORPORATION
6400 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

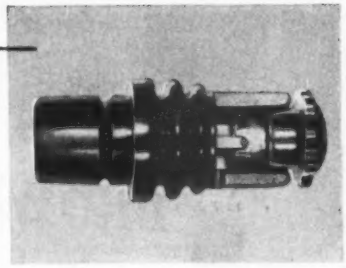
ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

T52-13

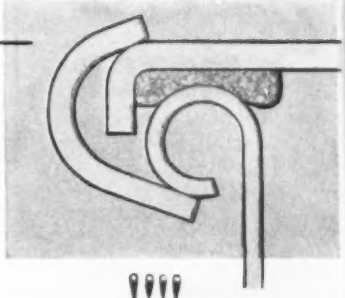
# Distribution Transformers

## 1 *NEW* HIGH VOLTAGE BUSHING



Wagner—pioneer in the use of tank wall mounted bushings—has developed a new high voltage bushing that means *faster, easier, safer* permanent transformer connections. *FASTER*—because the conductor is simply pushed in to the connector and tightened with a few turns of the knob . . . *EASIER*—no tools are needed . . . *SAFER*—the knurled knob is insulated to protect the lineman from accidental shock when tightening the terminal.

## 2 SHUR-SEAL COVER



Here's *true* sealed-tank construction! Covers are sealed to the tank with the Wagner SHUR-SEAL Clamping Ring. "Breathing" is completely prevented—no loss of oil can occur during shipment or handling. The SHUR-SEAL Ring maintains equal pressure all around the cover—yet permits easy accessibility by loosening a single corrosion-resistant bolt.

## 3 FORM W CONSTRUCTION

Wagner Form W Construction, with preformed cores of cold rolled, oriented grain steel, permits a liberal design in small size, light weight transformers that give excellent electrical performance. Core and copper losses are low . . . voltage regulation is good . . . exciting current is extremely low . . . and short time overload capacity is high. Form W Transformers pay dividends in longer service life.

## 4 INHIBITED OIL

Wagner pole-type distribution transformers are filled with inhibited oil, thus reducing oxidation to a minimum and retarding the formation of acids and sludge which ultimately cause its deterioration. This inhibited oil, in combination with the sealed tank construction provided by the Wagner SHUR-SEAL cover clamp adds years to the servicefree life of Wagner distribution transformers.

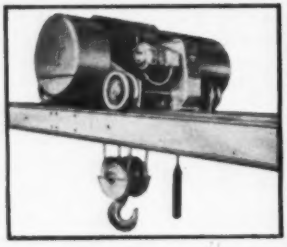
# you'll be better off

## FROM START TO STOP

with a

## BROWN BOVERI

QuickSTOP MOTOR



Electric trolley hoist driven by three QuickSTOP Motors.

**Here's the combination BRAKE & DRIVE, all-in-one motor that's designed to "take it" in tough industrial service.**

**QuickSTOP Motors require no outside power source or special controls for applying or releasing their brakes. They release their brakes and start instantly when power is applied. When power is cut, they stop and brake with 150% of normal torque. Absolutely no creep or backlash. Like any standard 3-phase motor, they can be reversed.**

**Suitable for reversing operations. Vertical or horizontal mounting. QuickSTOP Motors are available as drip-proof motors from .3 to 8 HP or as totally enclosed motors from .2 to 4 HP.**

**Where fast stops and starts are a problem—on original equipment or for replacements—it pays to install Brown Boveri QuickSTOP MOTORS. Get the facts about these world-famous, dependable, trouble-free motors.**

**QuickSTOP Motors are now used in**

Machine Tools
Planing
Automatic 4-spindle Drilling & Tapping
Graphic Arts Machinery
Textile Machinery
Pulley Block and Trolley Hoists
Watchmaking Equipment
Sugar Processing Units

MAIL COUPON TODAY

Please send me data and prices on QuickSTOP Motors

Name _____ Title _____

Company _____

Address _____

BROWN BOVERI

**BROWN BOVERI CORP.**

**19 Rector St., New York 6, N. Y.**


viscous impingement and electrostatic precipitation.

The actual effectiveness of any filter installation depends not only on the filter, and the choice of the right filter, but also upon associated equipment.

### Initiative and Competition

**CHARLES E. OAKES,** president, Pennsylvania Power & Light Co, before the National Conference of Electric and Gas Utility Accountants at New York.

Utility companies are not only in direct competition with every other industry for the consumer's dollar but they are also in competition with all other industry for the investor's dollar. Note that the utility industry with a gross of only one-thirtieth of all industry must provide funds for constructing one-sixth of all plants and in order to do so must call upon equity investors for one-third of available equity funds each year. This is competition compounded.

Competition between ideological forces has had a tremendous destructive effect on the industry. Determined political efforts aimed at socialization, piercing the economy in all directions, have seriously impaired the health of our free institutions. The damage has been great, because the work of this infiltration has been going on for the past twenty years.

### A New Look At Distribution

**CHARLES SAWYER,** Secretary of Commerce, before the Twentieth Anniversary Luncheon of the Sales Executives Club of New York.

The real problem facing us today is not production, but the terminals. Getting the raw materials that production chews up is the real crisis we face.

Distribution is essential in our economy and it is very necessary that American industry work as hard to develop distribution techniques as it has worked in the past on production techniques. This requires continued development of advertising and marketing.

I intend now to give much greater emphasis in the Department of Commerce to this matter by means of instituting a new section that will be devoted solely to the interests and problems of distribution. This will be done without adding personnel or putting an added drain on the nation's taxpayers.

# Motorola 2-Way Radio

## . . . *First Choice* OF THE POWER AND LIGHT COMPANIES

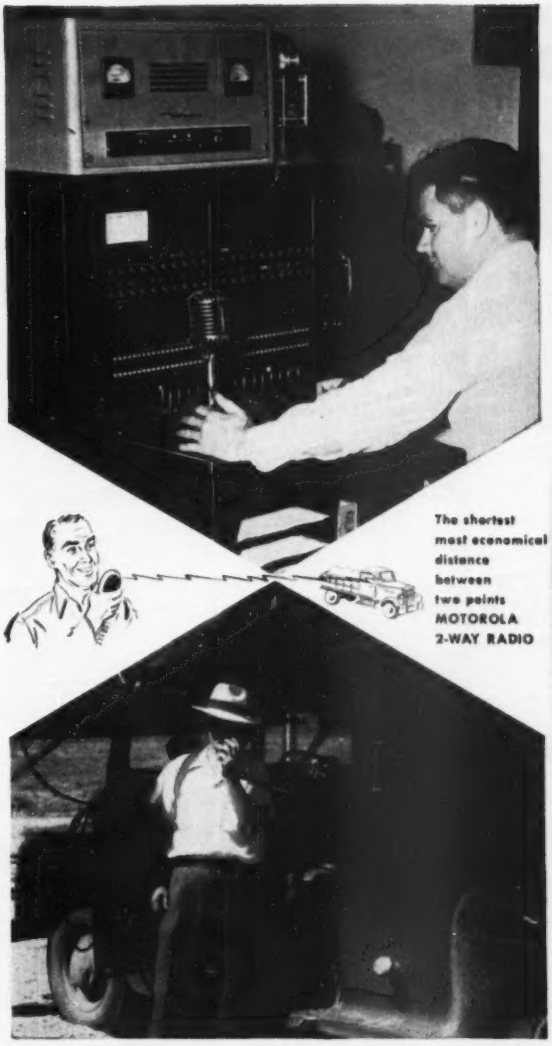
From coast to coast, Motorola radio is the first choice of the great majority of power and light companies. Here's why:

**Motorola radio increases operating efficiency.** Radio contact with vehicles saves outage time and eliminates many return trips. Gasoline and repair costs go down, depreciation losses are reduced and valuable man-hours are saved for productive effort. And . . . best of all . . . customer service is greatly improved. At every step of the way Motorola boosts efficiency, increases profits.

**Motorola equipment is designed for top performance and long life.** Superior components and research-tested circuits mean low operating costs, reduced maintenance and obsolescence-proof equipment. Your investment is *protected* for years to come.

**Motorola radio equipment has a wide edge on competition.** Motorola supplies the right equipment for *your* requirements . . . anything from Handie-Talkie® radiophones, mobile units and fixed stations to thousand-mile microwave networks! Your system is *engineered* for your job.

Write today for information and engineering assistance in planning your system.

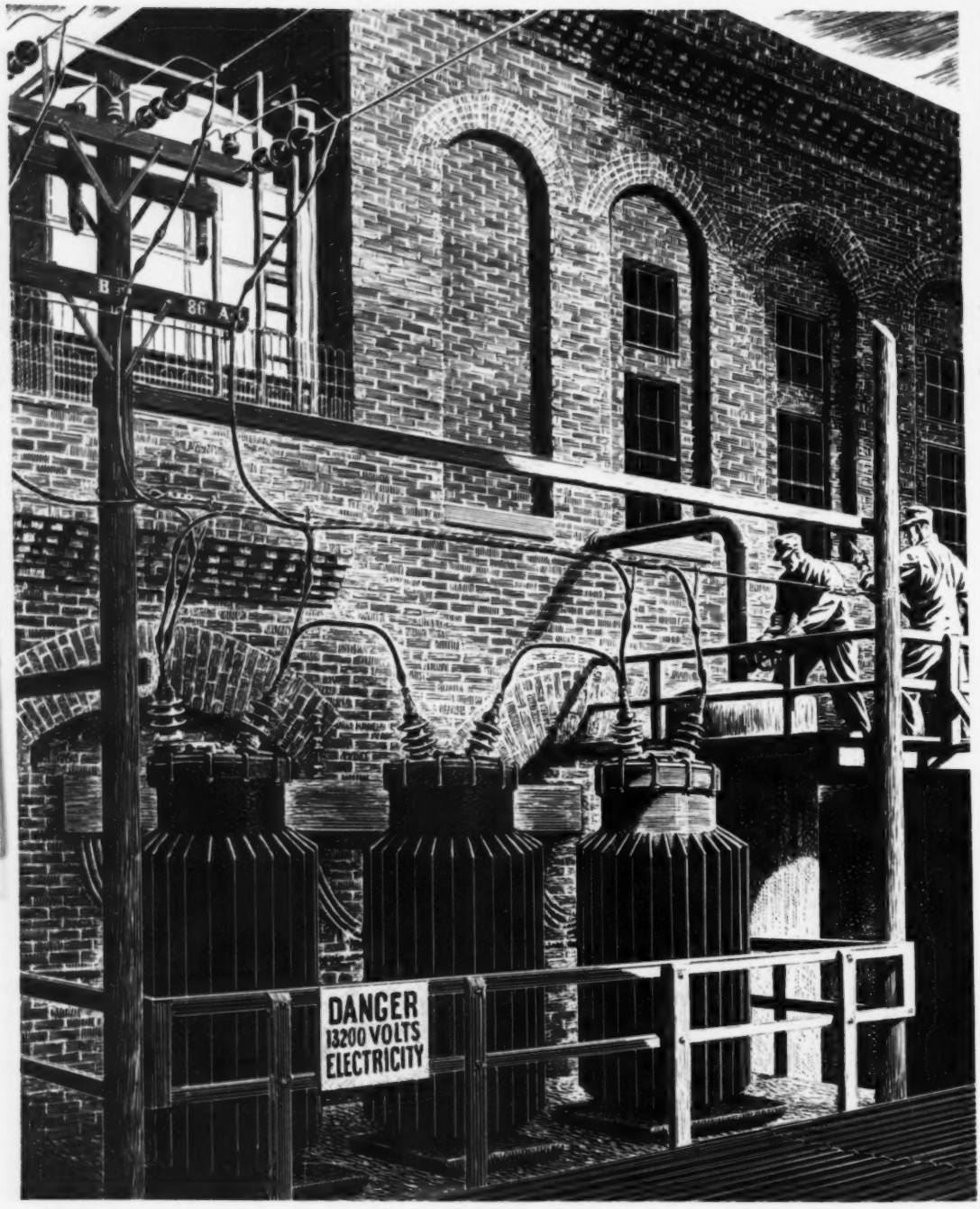



**Central dispatcher** at remote control console. Two-way radio at his finger tips helps get repair crews directly to trouble spots.

**Line crew foreman** using mobile radio. Instant contact with dispatcher saves travel time, gets needed supplies, summons help in emergencies.

**Motorola®**

Communications & Electronics Division
4545 Augusta Blvd., Chicago 51, Illinois
Rogers Majestic Electronic Ltd., Toronto, Canada




Before the new installation of Super Coronol transformer leads, workmen adjusting the valves on a condenser at an Omaha brewery might have been exposed to high voltage from bare wire leads. Now with the new leads, installed according to the cable layout suggested by a General Electric wire and cable specialist, there is an important improvement in safety and appearance.

WIRE AND CABLE FOR ELECTRIC UTILITIES

## Proposal from a G-E Specialist

# Solves bare wire problem in Omaha

In Omaha, they have a warm feeling for General Electric wire and cable specialists—because these specialists not only helped solve one specific problem, but in doing so they uncovered the answer to a whole class of similar situations.

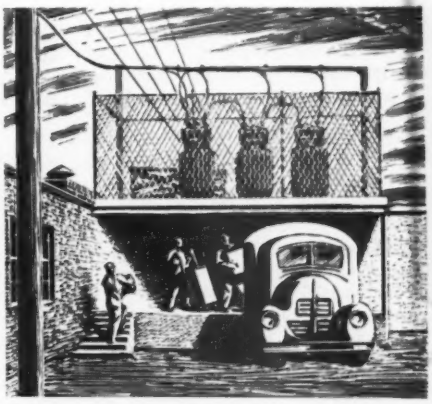
This is the way it happened:

In the Omaha Public Power District area a local brewery was confronted by this hazard—bare wire was used for the drops from an overhead 13.2-kv line to transformers. Liquid waste from vats kept the air moist. And with an elevated platform near by, it was possible for men working on a condenser to get too close to the high voltage for safety.

In looking for the answer, the Power District asked our Omaha office for a cable layout. The G-E wire and cable specialist submitted one—based on the use of 15-kv Super Coronol* Geoprene cable. This cable, which is shielded, not only eliminated the danger from bare wires, but improved appearance as well. Because the cable was preformed in the utility's service shop, and terminations made in advance, installation was made with a minimum of shutdown time for the brewery.

The Power District recognizes the advantage of this cable layout and has made another similar installation for a lithograph plant. In the future, where bare wire leads are a problem, the Omaha Public Power District has a solution.

The next time you have a question on cable, call on your G-E wire and cable specialist for prompt, expert help. You can reach him at the nearest G-E Construction Materials district office. Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.



This is the cable installation at a lithograph plant which is similar to the installation in the brewery, suggested by a G-E wire and cable specialist. It's another example of how G-E Super Coronol cable can solve bare wire problems.

*Registered Trade-mark General Electric Company

*You can put your confidence in—*

W48

GENERAL ELECTRIC

## NEWS ABOUT PEOPLE

# EEI Names Committee Heads

**Cassady, Hartman, and Snyder are assigned to division posts. Institute chairmen to serve during 1952-1953**

Edison Electric Institute has announced the committees and committee chairmen for 1952-1953. In making the announcement, the institute designated E. L. Cassady as top man of the accounting division; J. R. Hartman, commercial division; and E. H. Snyder, engineering division.

The committees and committee chairmen are included in the following four divisions:

**Accounting . . .** Accounting division executive, Cassady, Indianapolis Power & Light Co; application of accounting principles, H. S. King, Commonwealth Services, Inc; coordinator of customer activities, M. J. Walsh, Consolidated Edison Co of New York, Inc; customer accounting, G. F. Higgins, Detroit Edison Co; customer collections, D. M. Arnold, Pennsylvania Power Co; customer relations, C. J. Berner, Wisconsin Electric Power Co; depreciation accounting, G. T. Logan, Philadelphia Electric Co; general accounting, A. R. St. Bernard, Cleveland Electric Illuminating Co; internal auditing, A. I. Russak, Cincinnati Gas & Electric Co; plant accounting and records, E. D. King, Detroit Edison; and taxation, L. F. Scholley, CEI.

**Commercial . . .** Commercial division general, Hartman, Cincinnati G&E; commercial sales section, S. S. Sansbury, Upion Electric Co of Missouri; farm section, E. D. Smith, Dayton Power & Light Co; industrial power and heating section, Maxwell Cole, Philadelphia Electric; residential section, R. J. Miller, CEI; and special service section, J. M. Stedman, Pennsylvania Power & Light Co.

**Engineering . . .** Engineering division general, Snyder, Public Service Electric & Gas Co; electrical equipment, A. M. de Bellis, Consolidated Edison; hydraulic power, Hibbert Hill, Northern States Power Co; meter and service, F. A. Redding, Southern California Edison Co; prime movers, G. V. Williamson, Union Electric; and transmission and distribution, J. A. Pulsford, Public Service E&G.

**General . . .** Accident prevention, W. F. Brown, Consolidated Edison; area development, J. Frank Gaskill, Philadelphia Electric; codes and standards, D. C. Luce, Public Service E&G; electric power survey, Walker L. Cisler, Detroit Edison; financing and investor relations, H. H. Scaff, Ebasco Services, Inc; industrial relations, F. E. Verdin, CEI; insurance, I. M. Carpenter, Ebasco; legal, T. Justin Moore, Virginia Electric & Power Co; membership, E. S. Thompson, West Penn Electric Co, Inc; prize awards, Harry Restofski, West Penn Power Co; purchasing and stores, C. F. Ogden, Detroit Edison; rate research, I. L. Craig, Philadelphia Electric; statistical, Wallace Godard, CEI; and transportation, D. K. Wilson, Niagara Mohawk Power Corp.

•

**Paul D. Oesterle** has been appointed sales manager of the piping department of Dravo Corp's Machinery Division, Pittsburgh. He joined the corporation in 1941.

**W. W. Taylor** has been named manager of stockholder relations in Westinghouse Electric Corp's public relations department. Westinghouse also transferred **Carl R. Fittkau** from Baltimore, Md., to the headquarters public relations staff at Pittsburgh. In line with the establishment of regional public relations offices, **Julian Kilman** has been made district public relations manager in Washington, D. C., and **William D. Perkins** becomes district public relations manager at Chicago.

**John S. McDermott** has been appointed executive manager of the Electric Association of Kansas City (Mo.). He succeeds **Robert J. Samson,** who has resigned to accept a position with the Kansas City office of Arthur Young & Co, national firm of certified public accountants. For the past five years McDermott has been associated with radio station KMBC in special events, promotion, and sales. Samson was made executive manager of the association in 1948.

JOHN R. CONRAD

## S&C Electric Co Elects John Conrad President

John R. Conrad, vice president and treasurer of S&C Electric Co, Chicago, since 1945, has been elected president. He succeeds his father, Nicholas J. Conrad, who has been named chairman of the board.

John Conrad, who attended Yale and the University of Chicago, has been identified with the aircraft industry since graduating from college. For seven years he was associated with Douglas Aircraft Co, the last two years as properties manager at the Long Beach (Calif.) plant. He has been with S&C since 1945.

The elder Conrad, a co-founder of the firm in 1910, has served as president since reacquiring control in 1945 from Cutler-Hammer, Inc, which had operated S&C between 1930 and 1945.

•

**C. L. Peterson** has been named general sales manager of the Industrial Division of Minneapolis-Honeywell Regulator Co. Peterson has been regional manager for Honeywell's Midwest region in Chicago since 1950.

**Gordon Lyons,** district supervisor at Amarillo (Tex.) for Southwestern Public Service Co, has been made district manager at Pampa (Tex.).

**J. H. Brinker** has been named assistant executive in charge of distribution at A. O. Smith Corp, Milwaukee. He moves into this position after serving as general sales manager for the firm's Southwest district with head-

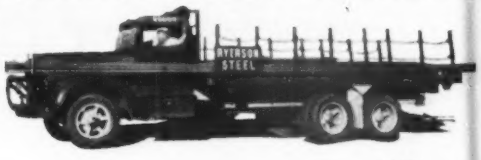
# FOR 110 YEARS...

1842

# QUICK SHIPMENT OF

1922

# STEEL FROM STOCK




1952

Here, at a glance, is a quick review of more than a century's progress in the delivery of Ryerson steel.

The original Dobbins made their plodding rounds from a single small iron store. Today, their mechanized successors speed delivery from a network of fifteen huge steel-service plants.

And, while the first Ryerson wagon carried such products as saddle tree, horse shoe and boiler iron, today's giant trucks deliver an almost endless variety of carbon, alloy and stainless steels.

The Ryerson sales representative, too, has changed with the times. Today he heads up a team of specialists who are ready and able to help you on every problem relating to steel from stock.

While current demand may deplete supplies of some sizes, our over-all stocks are large and complete. And you can always count on the same friendly will to help that steel buyers have found at Ryerson for 110 years.

**PRINCIPAL PRODUCTS: CARBON, ALLOY & STAINLESS STEELS . . . BARS, STRUCTURALS, PLATES, SHEETS, TUBING, ETC.**

# RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

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London Associate
The LEAGRAVE PRESS, Ltd

quarters at Houston, Tex. In his new post Brinker will provide general management service and direction to the manufacturing divisions in the distribution and marketing field.

LEONARD OLMSTED

## Leonard Olmsted Joins Electrical World Staff

Leonard M. Olmsted, division engineer, Duquesne Light Co, has joined the staff of Electrical World as associate editor.

Assigned to the distribution department of Duquesne, he has been active in engineering committee work in a number of industry associations. He is the retiring chairman of the Transmission and Distribution Committee of the Pennsylvania Electric Association. He is a member of the American Institute of Electrical Engineers' Subcommittee on Distribution System Recovery Voltage and a former member of the EEI-Nema Committee on Distribution Cutout and Power Fuse Standards.

Olmsted started his professional life with the central station department of Westinghouse Electric Corp. In 1934 he joined Duquesne Light. During the war in addition to his duties with the utility he served as a special consultant to the Army Air Force at Wright Field, Ohio.

He holds bachelor and master degrees in electrical engineering from Worcester Polytechnic Institute and is a registered professional engineer in Pennsylvania.

•

**John D. Seaver** has been named assistant manager of engineering of General Electric Co's industrial heating depart-

# 3 OUT OF 4

## CLASS "A" WINNERS OF GOLD SEAL AWARDS

## USED UNISTRUT®

### CHANNEL, HANGERS AND FITTINGS

All photographs by permission of Metals & Controls Corporation.

**Entry No. 284**

Over toolmaker's benches continuous rows of louvered, double 40-watt fixtures are supported by UNISTRUT channel at a height of 8'6". Over machines (in other photo) the same type UNISTRUT supported units are installed on 8' centers in rows 7' apart.

**Unique metal framing system contributes perfect fixture alignment, added safety and better appearance to winning industrial lighting installations.**

In the Merit Award Competition sponsored by the Fourth International Lighting Exposition (Cleveland, May 6-9, 1952), Gold Seal Awards were made for three outstanding industrial lighting jobs* using the UNISTRUT system of fluorescent fixture supports.

The advantages of using the UNISTRUT method as shown in the accompanying photos are obvious. It permits faster, easier, more accurate installation—requires fewer hanger stems and canopies. Cleaning and servicing cannot disturb fixture alignment. Lowers wiring and rewiring costs. UNISTRUT channel is approved as wireway in Chicago and more than 20 other major cities—additional proof of its versatility and usefulness. Try it on your next lighting job!

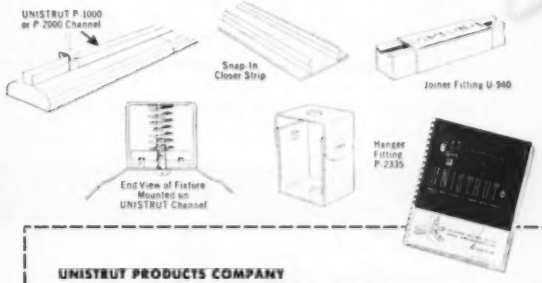
*Planned and executed by G. E. Pieper, Materials Engineer, Spencer Thermostat Division, Metals & Controls Corporation, Attleboro, Mass.

**Entry No. 287**

In the finished rolling mill of this plant, continuous rows of fixtures are supported by UNISTRUT channel.

**Entry No. 290**

In this high bay area the lighting units are supported in 3 continuous rows by UNISTRUT channel at a height of 21' to avoid a traveling crane.




UNISTRUT
The World's Most Flexible All-Purpose Metal Framing

U.S. Patent Numbers
2327567 2329835
2345650 2363382
2380379 2405631
2541908
Other Patents Pending

**Distributors and Warehouse Stocks in Principal Cities. Consult your Telephone Directories**

Write today for your FREE copy of New 78-page Catalog No. 700! Includes above drawings and countless other examples of how to mount, rack, frame, suspend and support all kinds of electrical and mechanical equipment.

**UNISTRUT PRODUCTS COMPANY**
**1013 W. Washington Blvd., Chicago 7, Illinois, Dept. W9**

Please send without obligation the items checked below:

☐ Catalog No. 700 ☐ UNISTRUT Sample

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

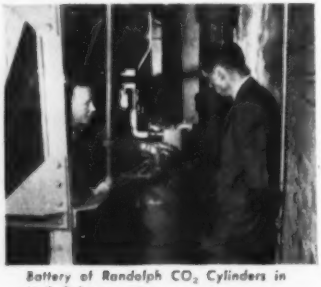
# U. S. TOBACCO COMPANY INSTALLS RANDOLPH AUTOMATIC FIRE SYSTEM

The U. S. Tobacco Company's large multiple unit dust collector presented an unusual and worrisome fire hazard, but this 150 pound Randolph Automatic System not only automatically detects and extinguishes any fire that might occur in the unit, but also shuts down the dust collector blower, and rings an alarm located on one of the lower floors of the building.

*Officials of the U. S. Tobacco Co., and the Nashville Fire Department inspect the Randolph Automatic System installed on giant dust collector.*

## Kills Fire, Sounds Alarm and Shuts Down Machinery

As in the U. S. Tobacco installation, Randolph Systems, in addition to automatically killing the toughest fires in split seconds, can also be equipped with duct and door closers, motor, fan and machinery shut-offs, warning alarms and other auxiliary safety devices. Systems are designed for both local application or total room flooding and are ideal for dip tanks, baking ovens, spray booths and hundreds of other applications.



*Battery of Randolph $CO_2$ Cylinders in U. S. Tobacco system.*

***Free Catalog and Engineering Service Available Without Cost***

Randolph's FIRE HAZARD INDEX gives correct equipment and methods for protection against 590 typical fire hazards. Write for your free copy today. Address: Randolph Laboratories, Inc., 12 E. Kinzie St., Chicago 11, Ill.

ment. Seaver, formerly engineer in charge of the company's Meter and Instrument Laboratory at West Lynn, Mass., will now make his headquarters at Schenectady, N. Y.

ERIC E. DeMARSH

## DeMarsh Elected a VP by Burndy Engineering

Eric E. DeMarsh, sales manager of Burndy Engineering Co, Inc, Norwalk, Conn., has been appointed vice president in charge of sales.

DeMarsh, who has filled the sales manager's post for the past four years, has been associated with Burndy for 16 years. He was named a member of the board of directors in 1948.

Before joining Burndy, DeMarsh was in the electrical contracting business and also was affiliated with United Electric Light & Power Co, now part of Consolidated Edison Co of New York, Inc.

## OBITUARY

### Arthur E. LaCroix

Arthur E. LaCroix, 57, an executive of the New England Electric System, died at Weston, Mass., Sept. 5.

LaCroix had served as president of Connecticut River Power Co, N. H., and Bellows Falls Hydro-Electric Corp, Vt., and executive vice president of New England Power Co, Mass., all NEES wholesale subsidiaries, since 1951. To assume these responsibilities he resigned as executive vice president of New England Power Service Co, a post he was named to in 1944.

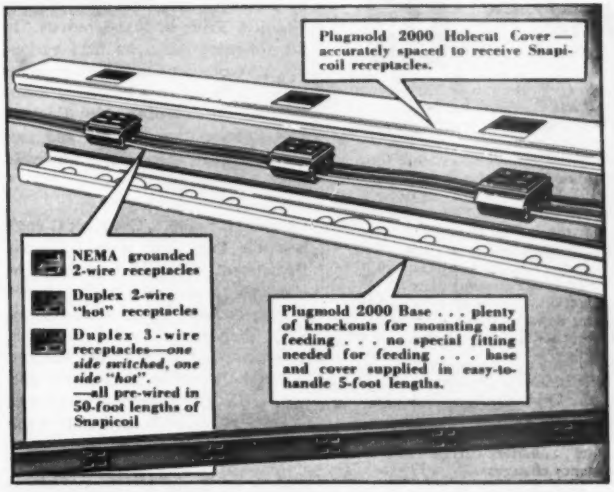
# WIREMOLD ANNOUNCES PLUGMOLD 2000

## *ONE Plugmold Raceway For THREE Wiring Services*
## *Faster to Install, Easier to Install, Cheaper to Install*

**PLUGMOLD 2000 has been tested in all types of construction**

***Proved best method yet devised for providing unlimited convenience outlets for homes, business, industry.***

Here—for the first time!—is a single raceway for all 3 services! Plugmold 2000 is Wiremold's new, improved raceway base and cover assembly designed to accept Snapicoil with NEMA grounded receptacles, 2-wire "hot" Duplex receptacles, or 3-wire Duplex receptacles *with one side switched and one side "hot"*.... For homes, office buildings, factories, stores —for new construction or the modernization of existing buildings—Plugmold 2000 has proved itself to be a far better, more modern way of providing *more* convenience outlets, more conveniently *located*. With Wiremold's famous Snapicoil prewired receptacles, Plugmold 2000 saves time and labor costs, because 3 simple steps complete any Plugmold 2000 installation.


Plugmold 2000 Holecut Cover — accurately spaced to receive Snapicoil receptacles.
NEMA grounded 2-wire receptacles
Duplex 2-wire "hot" receptacles
Duplex 3-wire receptacles—*one side switched, one side "hot"*.
—all pre-wired in 50-foot lengths of Snapicoil
Plugmold 2000 Base . . . plenty of knockouts for mounting and feeding . . . no special fitting needed for feeding . . . base and cover supplied in easy-to-handle 5-foot lengths.

## PLUGMOLD 2000 is EASY to install!

Required lengths of Plugmold 2000 base are mounted in *one continuous run*. The proper Snapicoil pre-wired receptacles are quickly snapped into the raceway cover. Then the cover, with receptacles all inserted, is snapped into the base. A few simple fittings complete the job!

## ELECTRICAL CONTRACTORS WELCOME PLUGMOLD 2000

Plugmold 2000, with Snapicoil, saves the time you usually have to spend pre-engineering the wiring job! All your electrician needs on the job are regular 5-foot lengths of Plugmold 2000 base and cover, and Snapicoil with proper receptacles—in one package for your convenience—and a few simple fittings. The only tools needed are a screw driver and a hacksaw! Plugmold 2000 reduces cutting and fitting to a minimum.

***Write today for new FREE PLUGMOLD 2000 Book!***

Tells the whole Plugmold 2000 story! . . . shows the many applications of Plugmold 2000 . . . shows how easy it is to install, and how easy it is to specify and order Plugmold 2000 in units.

**THE WIREMOLD COMPANY**
HARTFORD 10, CONNECTICUT

for
custom-engineered
POWER

look to... EP

Since 1909, the job of The Electric Products Company has been to create and develop special electrical rotating equipment . . . motors and generators to do existing jobs better or to reach into new fields to do jobs that couldn't be done before. The natural "by-product" of our more than 40 years of specialization is that you get equipment designed and built to the exact requirements of your application . . . equipment that has greater dependability, longer life and that requires less maintenance.

Send in the coupon below for detailed information about our Custom-Engineered synchronous motors and generators . . . d-c motors and generators . . . induction motors . . . battery chargers . . . frequency changers.

A nation-wide sales engineering and service organization stands ready to meet all User requirements.

THE ELECTRIC
PRODUCTS COMPANY

1731 CLARKSTONE ROAD
CLEVELAND 12, OHIO

Attach coupon to your letterhead for your copy of Bulletin Z 700

NAME_____
TITLE_____
COMPANY_____
STREET_____
CITY_____ ZONE____ STATE_____

ARTHUR E. La CROIX

He joined New England power system in 1916 in connection with its hydroelectric developments on the Deerfield River in Massachusetts. In the following years he held various executive positions in subsidiary companies of the system, becoming assistant vice president of the New England Power Association in 1936 and vice president of its three major wholesale companies in 1941.

**Charles G. Smith,** 41, electrical engineer for Palo Alto (Calif.) Electric Department, drowned Aug. 26 as he struggled to save his family after a boating accident in the High Sierras, where they were on vacation. Smith, who graduated in 1932 from Stanford University where he received his electrical engineering degree, worked with General Electric Co until 1945 when he assumed the Palo Alto post.

**Herbert H. Webb,** 49, formerly associated with Dayton Power & Light Co, died at New York Sept. 4. He had been with the power company from 1929 to 1944. After graduating from Purdue University, he was chosen by General Electric Co to do special work at Nela Park, Cleveland. Several years later he left GE to join Dayton P&L and in 1936 was made an assistant to the general manager. In 1944 he resigned the utility post to become sales manager for the American Felt Co, Detroit.

**Arthur J. Sandler,** an electrical engineer for Westinghouse Electric Corp, died Aug. 31 at Rio de Janeiro, Brazil. He had arrived in Brazil Aug. 15 to supervise the installation of electrical equipment in a steel plant at Itabira.

*How you*
SAVE ON HOIST MAINTENANCE

Safety-Pulls are available in 10 sizes with capacities from 1,500 to 30,000 lb.

Here are just a few of the "extras" that keep Coffing Safety-Pull Ratchet Lever Hoists on the job — and save on maintenance costs.

- Hoist frame is certified malleable iron — your guarantee of lasting durability.
- Sprocket and ratchet are special alloy drop-forged steel, heat-treated and ground.
- Chain is specially designed for Coffing Hoists to meet U.S. Navy specifications — and tested at 100 percent overload.
- Hooks are drop-forged, heat-treated alloy steel — will not break or straighten out.
- "Safety Valve" handle will bend before hoist is overloaded beyond maximum safe limits.
- All Safety-Pulls are factory-tested at twice their rated capacity.

Find out more about the hoists that stay on the job — and out of the repair shop. Write Dept. E9SP.

COFFING HOIST CO.
DANVILLE, ILLINOIS

Quik-Lift Electric Hoists • Hoist-Alls • Mighty-Midget Pullers • Spur-Gear Hoists • Differential Chain Hoists • Load Binders • I-Beam Trolleys

SOLD BY DISTRIBUTORS EVERYWHERE

*Your customer is served at ease*

*Your cashier or bookkeeper works at ease*

## With the NEW Sectional Service Counter

Here at last is the service counter that has all the advantages you've been looking for. Just check this list and see for yourself:

**1.** Your customer is waited on in comfort at a counter 50" high. Your clerk waits on him in comfort seated at a desk 31" high, with everything she needs within easy reach.

**2.** You save costly floor space with this sectional counter. Use one unit for the one-clerk office; combine units for the district office.

**3.** The working side can be fitted either with steel cabinets or with insulated Safe-Cabinets to give at least one hour's protection against fire to your valuable records, 24 hours a day.

Write today for full information on this money-saving sectional counter. Address Room 1359, Management Controls Reference Library, 315 Fourth Avenue, New York 10, N. Y.

**Remington Rand** INC.

# ELEVEN MILES OF INSTALLED UNDERGROUND

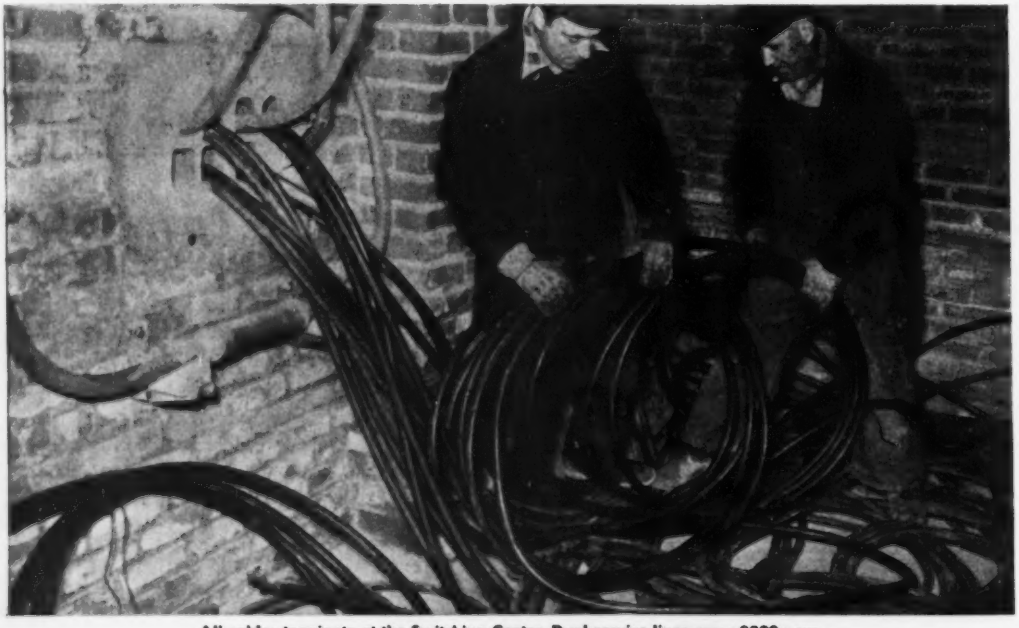
## Lightweight cable simplifies installation in ducts... is not subject to electrolytic corrosion

Entrance to State Hospital at Philadelphia

A newly modernized electrical distribution system is now in operation at the Philadelphia State Hospital.

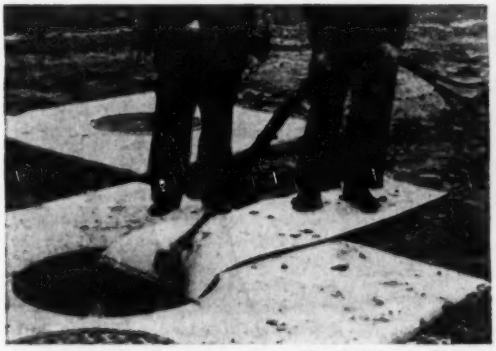
Part of the extensive modernization program was the installation of eleven miles of durable neoprene-jacketed cable, replacing lead-sheathed cable that had become unserviceable due to electrolytic attack.

The flexibility and lightness of the neoprene-jacketed cable enabled crew members to make "pulls" through the 6-hole ducts up to 700 ft. in length, even with the temperature down around 40°F.



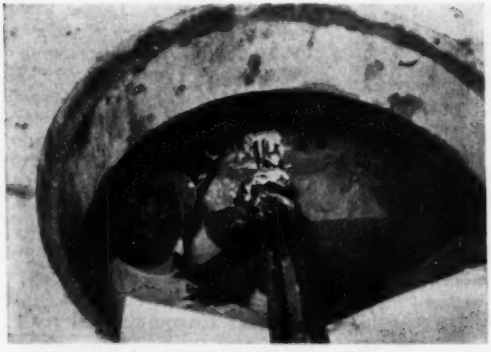
All cables terminate at the Switching Center. Dual-service lines carry 2300v current to 5 main areas, where it is "stepped down" to 115/208v for building use.

# NEOPRENE-JACKETED CABLE AT STATE HOSPITAL



**AT START OF 700-FT. PULL,** steel-wire "basket" is placed over three single-conductor cables to secure them to the pulling wire. Tension tightens the grip.

**"PAYING OUT" OPERATION** requires only one man per cable. Abrasion-resistant neoprene jacket provides excellent protection against rough surfaces around manhole and ducts.



**SOAPING THE CABLES** facilitates the "pull." Lubricants are no threat to rugged neoprene jacket. Even contact with grease and oil in old ducts presents no problem.

**AT END OF PULL,** "basket" is removed by releasing tension. Light weight and flexibility of neoprene-jacketed cable permitted 700-ft. "pull" in *one hour, ten minutes.*

**Ask your supplier** about neoprene-jacketed cable made in single and multiple conductor types for a wide range of voltage ratings. Because of neoprene's superior properties, this improved cable can be installed with equal success in ducts, above the ground, and directly in the ground itself.

New, interesting applications of neoprene are described in each issue of the Neoprene Notebook. Write today for your free subscription. E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Div. G-9, Wilmington 98, Delaware.


**NEOPRENE**

The rubber made by Du Pont since 1932

DU PONT

REG. U.S. PAT. OFF.

150th Anniversary

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

GENERAL ELECTRIC Vice Pres Chester H. Lang helps six-year old Madeleine Edison Sloan, great granddaughter of Thomas Edison, close the same switch that started up generators in Edison's Pearl Street electric power station in New York 70 years ago. This time switch started a showing of GE's color film "Freedom and Power," which was premiered recently in New York

# GE Power Film Makes Debut

## "Freedom and Power" shown in connection with the 70th anniversary of opening of Edison's Pearl Street Station

The story of electric power and the American heritage is told in a new, full-color, documentary film entitled "Freedom and Power."

This film, produced by General Electric Co, was premiered recently at the Waldorf-Astoria Hotel, New York, before more than 350 officials of industrial and electric utility companies in the area. The premiere was held in conjunction with the 70th anniversary of the opening of Thomas Edison's Pearl Street Station (N. Y.), the nation's first central station electric power plant.

**Depicts America's History . . .** "Freedom and Power" dramatizes electric power as a significant development of the American heritage of freedom, created by the driving urge of free men to build and grow, and bringing a new way of life destined to expand and multiply our freedoms.

Covering some of the most stirring and significant events in American history, the film starts with the first shots fired for freedom at Lexington, surges through the saga of Westward expansion, and ends with the emergence of this nation as the world's greatest power for freedom.

**Animation Used . . .** The 16-mm, sound, Kodachrome production is 29 minutes in length and includes both live-action scenes and colorful animation. In portraying the early years of American history, a new technique called "anistration" was used whereby sections of carefully drawn illustrations are animated. Although in some sequences professional actors and actresses have speaking roles, much of the story line is carried on by a narrator.

Research on Benjamin Franklin's electrical experiments was long and exhaustive. Among the studies it was discovered that Franklin actually made plans to cook a turkey by electricity. Bells in his home were connected to a lightning rod so that every time a bolt struck the rod they rang out.

**Edison's Station . . .** One animated scene depicts Thomas Edison's Pearl Street Station. The central station system of power generation, designed by the inventor to make possible widespread use of his new incandescent lamp, is universally used today. On Sept. 4, 1882, when the "jumbo" generators were first turned on, 59 customers received electricity for their lamps. Within 14 months, 508 establishments had been wired, and 12,732 lamps were on the circuit.

With scenes depicting the use of power in the mine, the mill, the machine shop, and on huge assembly lines, "Freedom and Power" proves that industry is dependent on electricity.

**Atomic Energy . . .** In the climax, the film presents the wonders of today, such as remote-control wiring and the newly developed heat pump. Electric power from atomic energy is one of the future forecasts presented in the film.

In commenting on the film, B. L. England, president of Atlantic City Electric Co and Edison Electric Institute, said " 'Freedom and Power' is one of the finest documentary films on the importance of electricity and freedom I've had the pleasure of seeing. It will undoubtedly have the fullest support and cooperation of the electric industry, who should see that this film gets to the greatest number of people in the shortest period of time."

Two years in the making, "Freedom and Power" is the 25th offering in the More Power to America Program, a series of broad-scale visual presentations produced by GE's apparatus advertising and sales promotion department which is located at Schenectady, N. Y.

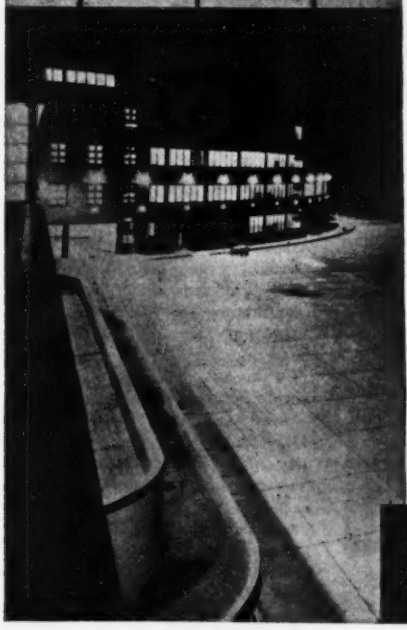
## Refined Copper Stocks Increase During August

Stocks of refined copper held in the United States by members of the Copper Institute, Inc, at the end of August totaled 83,771 tons, an increase of 10,114 tons over the 73,657 tons held on July 31.

During August deliveries to domestic fabricators increased to 126,941 tons compared with deliveries of 115,179 in July. Refined production, however, dropped to 95,366 tons from 96,049.

Outside the United States refined stocks amounted to 167,328 tons on Aug. 31, a decrease of 13,064 tons

# Another Important Installation of HOLOPHANE REFRACTOLENS*



At the GREATER

## PITTSBURGH AIRPORT

•

*Units in the Building Face*
*Light the Loading Areas*

**The new Greater Pittsburgh Airport is the most modern airplane Terminal in the world. It is a tribute that Holophane REFRACTOLENS units have been used to light the airport's loading space. These units recessed at two levels in the face of the building follow modern trends in lighting. They produce remarkably effective lighting with five footcandles across the walkways and out to the stairs for boarding planes, 60 feet from the building. Two sizes of REFRACTOLENS units, equipped with visors, were used: lower units, 300 watts each; upper units, 750 watts . . . One more significant result of Holophane research and prismatic light control . . . Architects and engineers are invited to consult Holophane Engineering Service.**

*James Paul Warner—Consulting Electrical Engineer*
*Theodore Eichholz—Supervising Architect*
*Joseph Hoover—Consulting Architect*

Holophane

*®

**HOLOPHANE COMPANY, INC.**

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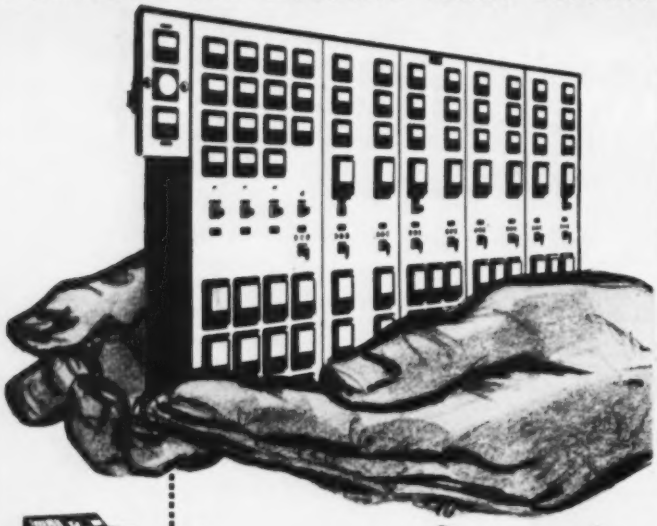
THE HOLOPHANE COMPANY, LTD., THE QUEENSWAY, TORONTO 14, ONTARIO

ENGINEERED FOR EFFECTIVE PLANT CONTROL



CONTROL DESKS

RELAY PANELS

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GAS ANALYZERS

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***lies the answer to your power board needs***

When you turn your switchboard, gauge board, or panel board problem over to Taller & Cooper, you have added to your own staff complete and diverse facilities for research, development, engineering, and manufacturing.

Whether the equipment is designed by us, or built from your plans, the most up to date engineering techniques and manufacturing methods are coordinated to give you economical production, minimum installation time, and satisfaction of the most exacting specifications.

Send us your problems. Our staff will suggest practical, economical equipment to solve them.

**TALLER & COOPER, INC.**
*Engineers-Manufacturers*
75 FRONT STREET • BROOKLYN 1, N. Y.

POWER CONTROL EQUIPMENT—DIGITAL CONVERTERS AND PRINTERS
WIND TUNNEL INSTRUMENTATION
SPECIAL PURPOSE INSTRUMENTATION
TOLL COLLECTION SYSTEMS—TOLL BOOTHS


below the 180,392 tons on July 31. August deliveries dropped to 73,945 tons from 86,345 in July and refined production was 98,929 tons compared with 99,201.

## MANUFACTURING BRIEFS

**Production of primary aluminum** in the United States during July totaled 156,735,591 lb, the Aluminum Association has reported. July exceeded the June output of 154,952,241 lb by nearly 2 million lb.

**Aluminum Co of America** has revealed that dry weather in Western states might reduce aluminum shipments in the fourth quarter of the year. Alcoa said the drought had cut the amount of water power available to generate the huge amounts of electricity neded to make aluminum. The company has closed one of six potlines at Vancouver, Wash., and one of two potlines at the partly completed plant in Wenatchee, Wash.

**Babcock & Wilcox Co** has moved the Cleveland district sales office of its Tubular Products Division into larger facilities. The headquarters are now located in the National City Bank Bldg., 629 Euclid Ave.

**General Electric Co** has moved the home laundry equipment department headquarters to Appliance Park, Louisville, Ky., from Bridgeport, Conn. Movement of the headquarters completes the transfer to Louisville of all sales, marketing, and other management personnel of the Major Appliance Division.

**Arrow, Hart, & Hegeman Electric Co,** Hartford, Conn., plans to tranfer its Southwest headquarters from Dallas to Houston, Tex. The company is negotiating for an office and warehouse location.

**Westinghouse Electric Corp** has been awarded a $1,195,000 order for 16 6,000-kva unit substations by the Seattle City Light Department. The substations, which will be used primarily to handle load growth in new residential areas, will reduce the 26-kv subtransmission voltage to 4,160 v for local distribution. Eight of the substations will be put into service in 1953, the remainder in 1954.

British Columbia Electric Company Limited, in pioneering their 345-kv transmission line, has most modern installation in the Western Hemisphere. PREFORMED ARMOR RODS will protect the initial single conductor at the support points as well as the dual conductors, illustrated above, which are planned for ultimate installation.

*Shown in the picture are, left to right:* J. P. Fraser, assistant chief engineer, electrical division; F. O. Wollaston, superintendent of design, engineering division; T. Ingledow, vice-president and chief engineer; J. H. Steede, executive assistant to vice-president and chief engineer; H. W. Smith, assistant chief engineer, engineering division.

**PREFORMED LINE PRODUCTS COMPANY**

5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO

The Old Reliable

EVERSTICK ANCHORS...

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life

● They speed up work and provide dependable anchorage in new construction and maintenance. Quick and easy to install—made of tough rust-resistant malleable iron—their holding power "tops" all others. Available two-way, three-way, four-way, and cone types. Write for facts.

AN EXCLUSIVE EVERSTICK FEATURE
Exclusive Everstick nut housing. Locks anchor firmly on rod. No chance of rod slipping thru anchor.

EVERSTICK ANCHOR CO.
Manufacturer of "THE ANCHOR OF MERIT"
FAIRFIELD, IOWA

## SALES ASSIGNMENTS

### COMPANY STAFFS

**A. O. Smith Corp,** Milwaukee, has appointed Phil D. Gardner assistant manager of its eastern product service branch at Union, N. J. Gardner, formerly in the company's Harvestore and Automotive Divisions, has been with the Smith firm since 1946.

**Okonite Co,** Passaic, N. J., has named Julius G. Derse manager of utility and industrial sales for the New York district. Derse, a member of the firm's sales department since 1929, will continue to handle his utility, shipbuilding, and industrial accounts from Okonite's New York office.

**BullDog Electric Products Co,** Detroit, has assigned Arnold S. Larsen to its New York office and Kirklin L. Kelly will cover the firm's Huntington, W. Va., territory.

**Cooper-Bessemer Corp,** Mount Vernon, Ohio, has assigned Robert E. Hensley to its Tulsa office. Hensley, an engineering graduate of Oklahoma A&M, received his specialized training in engine and compressor operation at the firm's headquarters plant at Mount Vernon.

**Libbey-Owens-Ford Glass Co,** has named Willis J. Gray district sales manager of Fiber Glass Division's Los Angeles headquarters, located at 905 Architects Bldg., 816 West Fifth St. Gray started with LOF Glass in 1943 in the firm's California industrial and distributor sales divisions.

**General Electric Co** has named Clyde B. Hinton electric utility application engineer in the Seattle (Wash.) office of its Apparatus Sales Division. He will serve the Seattle-Spokane area.

**Kasier Aluminum & Chemical Sales, Inc,** has assigned W. Lyle Sturtevant to the electrical conductor staff of its Chicago general sales offices. Sturtevant previously was executive manager of the Alabama Rural Electric Association of Cooperatives.

**Westinghouse Electric Corp** has appointed Robert W. McLean Pacific Coast market development representative with headquarters in San Francisco. McLean has filled the post of market analyst in the market planning department since joining Westinghouse at East Pittsburgh, Pa., in 1949. He will guide market development activities relating to industrial products in the district.

### REPRESENTATIVES

**Motorola, Inc,** Chicago, has appointed D. M. Lucas, Inc, as its distributor in the Nebraska territory. The new distributor, located at 1022 Farnam Ave., Omaha, will handle Motorola's complete line of television sets, auto, home, and portable radios. D. M. Lucas, who heads the firm, has been associated with Motorola since 1935.

**Warren Wire Co,** Pownal Vt., has appointed Smith Co, 16 Northfield Ave., West Orange, N. J., as its representative in the Long Island, N. Y., and northern New Jersey areas. Warren also named the D. G. Quinlan Co, 4700 Frankfort Ave, Philadelphia, as a representative in eastern Pennsylvania, southern New Jersey, Maryland, and Delaware.

We Can Make YOUR POLES LAST LONGER

WITH AN
OSMOSE
INSPECTION AND TREATING PROGRAM

This program, performed by our highly skilled crews, can save your system hundreds of thousands of dollars in REPLACEMENT COSTS by

1. Absolutely arresting groundline decay of your poles and
2. Giving you up-to-date pole records.

Treatment charge is as low as 4% of replacement costs and pole life is extended for approximately 8-10 years. Let us send you ALL the details!

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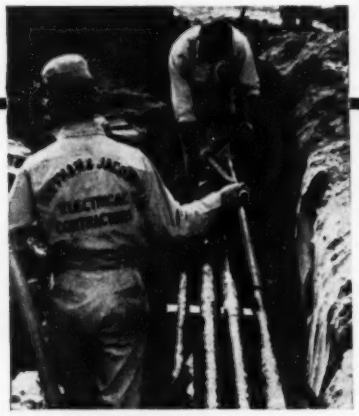
OSMOSE WOOD PRESERVING CO., INC.
1437 BAILEY AVE. BUFFALO 12, N. Y.

# SINGLE WRAP application solves CORROSION PROBLEM

**MAN AND MULE.** Whether Polyken 882 is applied by hand or by an electrically operated "pipe mule" (as shown here) it wraps quickly and economically, producing an even, wrinkle-free coating.



**WRAPS UP THE JOB** at the job-site. Polyken 882 protects electrical conduits on new pier for Long Beach Harbor Department.

**One protective coating of Polyken replaces multiple packs, wraps and coatings on underground conduits.**

Hoffman and Jacobs, Long Beach, California, are wrapping several thousand feet of underground conduits on huge new Pier D. Where they formerly used three layers—felt, tar and paper—they now do the job easier, faster and more economically with single-wrap, Harbor Dept. approved, Polyken 882.

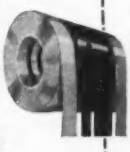
This established protective coating is the only pressure-sensitive tape made from oriented polyethylene, a material long recognized for its excellent anti-corrosion characteristics.

Polyken 882 is
- elastic
- stretches to conform to odd shaped surfaces
- corrosion-proof
- moisture-proof
- fungus-proof
- solvent resistant

No. 882 is only one of hundreds of Polyken tapes engineered to save you time and money. Send in coupon today for free brochure and samples.

TAILORED TO YOUR JOB

**Polyken®**



**INDUSTRIAL TAPES**

**Department of Bauer & Black**
**Division of The Kendall Company**

**Polyken, Dept. EWJ**
**222 West Adams St., Chicago 6, Illinois**

Please send specifications, samples and brochure on Polyken No. 882.

**Name**_____ **Title**_____

**Company**_____

**Street Address**_____

**City**_____ **Zone**____ **State**_____

"Buffalo" Tips on FANS

WHAT TO LOOK FOR
In Choosing An
INDUCED DRAFT FAN

1. *Rugged, Accessible Housings.* The ideal induced draft fan housing is of heavy steel plate in removable sections that are easy to handle. "Buffalo" I. D. housings are known for their sturdy, oversize construction, plus convenience of assembly or dismantling. Note inlet vanes, which increase efficiency and minimize erosion.

2. *Adequate Shafts, Couplings, Bearings.* Note oversize "Buffalo" shaft and bearing in above photo. Thrust collars are turned out of solid material. "Buffalo" bearings have large oil reservoirs, large bearing surface, babbitted and lubricated thrust shoulders, and are water cooled when necessary.

3. *Protection Against Heat and Erosion.* "Buffalo" rotors and housings are extra heavy to resist the continual storms of erosive fly-ash, and where necessary, are supplied with removable scroll liners and welded-on rotor wearing strips.

4. *Extra Heavy Gauge Rotors, Dynamically Balanced.* All "Buffalo" wheels are factory balanced by precision equipment, for vibration-free performance, so important for smooth, efficient operation. For further facts on selection of a draft fan, write now for BULLETIN 3750.

BUFFALO FORGE COMPANY
212 Mortimer St., Buffalo, N. Y.
Publishers of "Fan Engineering" Handbook
Canadian Blower & Forge Co., Ltd.
Kitchener, Ont.
Branch offices in all Principal Cities

"Buffalo" DRAFT FANS

## New Electrical Construction

New electrical construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is included.

### UTILITIES

#### Proposed Construction

**Ala., Mobile**—Mobile Television Corp., 211 American Bank Bldg., New Orleans, La., television station. $798,000. E. C. Page, Bond Bldg., Wash., D. C., consult. engr.

**Ala., Mobile**—U. S. Eng., P.O. Box 1169, Zone 7, revisions and extensions to electric distr. sys. at Mobile District Office Bldg. Plans deposit $5.

**Arizona**—Bureau Reclamation, Dpt. Interior, Phoenix, Ariz., const. Yuma substation addn., Davis Dam Proj. Spec. 200C45.

**Ariz., Tucson**—Old Pueblo Broadcasting Co., 115 W. Drachman St., television station, $369,700. E. C. Page, Bond Bldg., Wash., D. C., consult. engr.

**California**—Bureau Reclamation, Dpt. Interior, P.O. Box 570, Tracy, electric distr. sys. for Columbia and Mowry Pumping Plants, Central Valley Proj. Spec. 200C-211.

**California**—Bureau Reclamation, Dpt. Interior, Bldg. 1A, Denver Federal Center, Denver, Colo., two 220,000 volt circuit breakers and one bushing potential device for Folsom-Elverta terminal switching facilities, Central Valley Proj.; American River Div., Spec. DS4776 L. N. McClellan, ch. engr.

**Calif., Fresno**—McClatchy Broadcasting Co., 21 and Q Sts., Sacramento, television station. $626,630. George C. Davis, Munsey Bldg., Wash., D. C., consult. engr.

**Calif., Sacramento**—McClatchy Broadcasting Co., 21 St. and Q St., television station. $769,180. George C. Davis, Munsey Bldg., Wash., D. C., consult. engr.

**Calif., Sacramento**—Sacramento Broadcasters, Inc., Box 94, television station, $350,600. McIntosh & Inglis, Wyatt Bldg., Wash., D. C., consult. engrs.

**Colorado**—Southeast Colorado Power Assn., La Junta, 513 mi. rural distr. lines, Colo. 170-Powers Sec. II, $150,000. C. H. Guernsey & Co., 2701 N. Oklahoma St., Oklahoma City, Okla., engrs.

**Conn., Hartford**—Hartford Telecasting Co., Inc., 790 Windsor St., television station, $866,350. Jansky & Bailey, Natl. Press Bldg., Wash., D. C., consult. engrs.

**Fla., St. Petersburg**—Tampa Bay Area Telecasting Corp., 901-906 First Federal Bldg., television station, $501,300. Commercial Radio Equipment Co., 1319 F St., Wash., D. C., consult. engr.

**Ga., Columbus** — Georgia-Alabama Broadcasting Corp., 1213½ Broadway, television station, $470,000. A. D. Ring & Co., Munsey Bldg., Wash., D. C., consult. engrs.

**Idaho**—Bureau Reclamation Dpt. Interior, Bldg. 1A, Denver Federal Center, Denver, Colo., furnishing, installing four 11,500 volt generators for Palisades Power Plant, Palisades Proj. Spec. DS 3772. L. N. McClellan, ch. engr.

**Ill., Rockford**—Rockford Broadcasters, Inc., 109 S. Water St., television station. $447,000. Craven, Lohnes & Culver, Munsey Bldg., Wash., D. C., consult. engrs.

**Ind., Indianapolis**—Television Indianapolis, Inc., 810 Fletcher Trust Bldg., television station. $699,350. Jansky & Bailey, Natl. Press Bldg., Wash., D. C., consult. engrs.

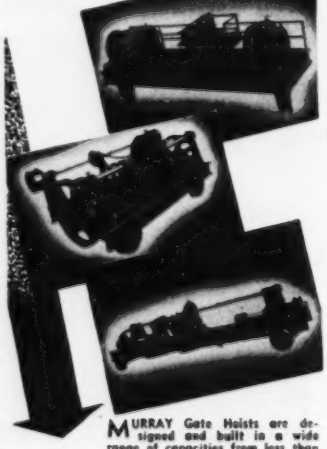
**Minn., Alexandria**—Runestone Telephone Assn., Alexandria, rural telephone proj. 229 mi. open wire, 7 mi. drop wire, 7.27 mi. cable, Barrett and Hoffman, Plans deposit $10. Christopherson Eng. Co. Fergus Falls, engrs.

**O., Jamestown**—Royal Electric Co., Robt. E. McNett, pres., Jamestown, aircraft components factory, $170,000.

**O., Shelby**—City, City Hall, impvv. municipal power plant with 7,500 kw turbine generator, house generator addn., 90,000

DESIGNED and BUILT TO MEET ALL REQUIREMENTS FOR ANY SIZE POWER DAM

Murray
GATES and GATE HOISTS



MURRAY Gate Hoists are designed and built in a wide range of capacities from less than one ton to over one hundred tons . . . from the smallest hand operated to the largest motor operated gate hoist.

During our over half century of designing and building gate hoists, we have developed many designs for the different types of gate hoist problems. Perhaps we have several designs and patterns that will fit your requirements. In planning gates or gates hoists, we suggest you communicate with us before your plans for the project as a whole, are complete . . . it will save expense and much preparation time. We also build gate hoists especially from your plans and specifications, if desired.

*Write for complete information and Engineering Department recommendations.*

D. J. MURRAY MANUFACTURING CO.
*Manufacturers Since 1883*
WAUSAU - WISCONSIN
MURCO

# Pull 12 Conductors Where You Have 7 ... Use ROCKBESTOS PNR® Control Cable

Conventional 7-conductor #9 AWG in 1¼" conduit

PNR 12-conductor #9 AWG 1¼" conduit

- **YOU USE THE SAME SIZE CONDUIT**
- **YOU SAVE STEEL**

Because Rockbestos PNR Control Cable is 46%* smaller in area than competitive control cables, it enables you to put 12-conductor PNR where you would use 7-conductor cable. This means you save critical steel conduit and fittings, because you put more conductors in a given conduit. Write for the PNR story.

## ROCKBESTOS PNR

*... another different, better cable by*

**ROCKBESTOS PRODUCTS CORPORATION, NEW HAVEN 4, CONN.**

the originators of **A.V.C.®**

New York • Cleveland • Detroit • Chicago • Pittsburgh • St. Louis
Los Angeles • Oakland, California • New Orleans • Seattle

### QUICK FACTS ABOUT PNR

- 46% smaller area* ... 28% smaller diameters*. Use smaller conduit and fittings or put more conductors in present conduit.
- Dielectric breakdown ... over 40 times operating voltage.
- Lighter and smaller. Easier to handle, store, ship, pull through conduit.
- Flexible to —25°C (—13°F). No cracking!
- Rated 600 volts ... conductor operating temperature 75°C (168°F).

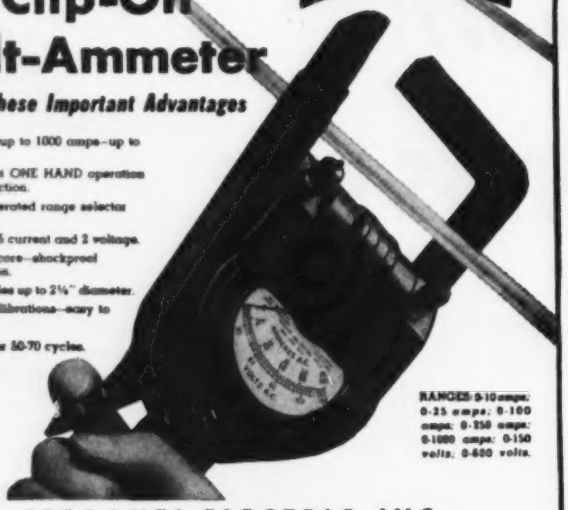
*Average determined by comparison with competitive control cable.

# The 7-Range Clip-On Volt-Ammeter

FERRANTI

**Offers These Important Advantages**

- Measures up to 1000 amps—up to 600 volts.
- Convenient ONE HAND operation —trigger action.
- Thumb operated range selector switch.
- 7 ranges—5 current and 2 voltage.
- Insulated core—shockproof construction.
- Takes cables up to 2¼" diameter.
- Distinct calibrations—easy to read.
- Suitable for 50-70 cycles.



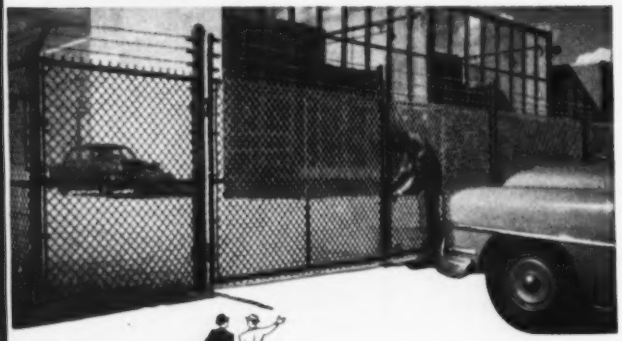
RANGES: 5-10 amps; 0-25 amps; 0-100 amps; 0-250 amps; 0-1000 amps; 0-150 volts; 0-600 volts.

**FERRANTI ELECTRIC, INC.**
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
FERRANTI, LTD., Hollinwood, England — FERRANTI ELECTRIC, LTD., Toronto, Canada



# PAGE FENCE — Since 1883

• AMERICA'S FIRST WIRE FENCE •



**Sabotage** is a danger which calls for vigilance day and night. Property line vigilance is the job for Page Chain Link Fence, now as it has been for more than 60 years. Consult the nearby, long-experienced Page Fence engineering and erecting firm, which will submit cost estimates without obligation. Name and address will be sent with illustrated fence data on request.

*Write to PAGE FENCE ASSOCIATION in Monessen, Pa., Atlanta, Bridgeport, Chicago, Denver, Detroit, Los Angeles, Philadelphia, New York or San Francisco.*

PRODUCT OF PAGE STEEL & WIRE DIVISION OF AMERICAN CHAIN & CABLE COMPANY, INC.


lb. steam boiler, auxiliary equipment, $1,797,400, Wm. Kammerer & Assoc., 1900 Euclid St., Cleveland, consult. engrs.

**Oregon**—U. S. Eng., City-County Airport, Walla Walla, Wash., installing nonembedded parts of turbines, governors, fishway controls, etc., McNary Dam, Inv. 52-17. Extended date.

**R. I. Newport**—P. Wks. Dpt., Naval Base, structural repairs to power plant, incl. painting Bldg. 86, NOY 73825, Spec. 34862. Plans deposit $10. power plant imprvs. Bldg. 55, electric work, ventilating, hot water and heating sys., NOY 73462 (8F), Spec. 34574. Plans deposit $10.

**South Dakota**—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo., furnishing and del. f.o.b. cars shipping point or f.o.b. cars Pierre, fabricated structural-steel towers for the Missouri River crossing for the Oahe-Midland 115 kilovolt transmission line, Transmission Div., Missouri-Oahe Dist., Missouri River Basin Proj. Inv. No. DS-3794.

**Tex., Mercedes**—Magic Valley Electric Co-operative, Inc., Mercedes, plans by Wm. C. Baxter Pioneer Bldg., Weslaco, masonry system bldg., incl. warehouse, garage, etc. $250,000.

**Washington**—Bureau Reclamation, Dpt. Interior Bldg. 53, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars shipping point or f.o.b. cars Quincy, Wash., distr. switchboard for Babcock Pumping Plant, Columbia Basin Proj., Spec. DS 3789. L. N. McClellant, ch. engr.

**W. Va., Wheeling**—WKWK Television Corp., 1604 Market Wt., television station, $500,775, E. C. Page, Bond Bldg., Wash., D. C., consult. engr.

**Wyoming**—Bureau Reclamation Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo., furnishing, del. f.o.b. cars at shipping point or f.o.b. cars at Casper, Wyo., transformers, resistors for Alcova Power Plant, Kendrick Proj. Spec. DS 3792. L. N. McClellan, ch. engr.

## Low Bidders & Contracts Awarded

**Md., Baltimore**—Howard P. Foley Co., Read and Calvert Sts., Baltimore 2, Md. LB $191,700. electric distr. sys., renovation, imprvs., Maryland Penitentiary, State, Dpt. P. imprvs., 606 Park Ave., Baltimore 1, Md. Turpin, Wachter & Assoc., 1004 N. Charles St., Baltimore, Md., archts.

**Ohio**—Columbus & Southern Ohio Electric Co., 215 N. Front St., Columbus, O. Owner Builds. $550,000. 139,000 volt transmission line from Chillicothe, Ross Co. to Peebles, Adams Co.; 69,000 volt transmission line from Peebles to Waverly, Pike Co.; imprv. lines in vicinity of proposed atomic energy plant, Pike Co., OHIO.

**Oklahoma**—Sisco Electric Co., Amarillo, Tex., LB $928,736, est. $975,000. 150 mi. 69 kv electric transmission line; B-Line Constr. Co., First Natl. Bldg., Oklahoma City, Okla. LB $531,967, est. $550,000. 7 sub-stations, Caddo Co., Western Farmers Electric Co-operative, Anadarko, Okla. Bids Aug. 26.

**Oregon**—Parker-Schram Co., Builders Exchange Bldg., Portland, Ore., CA. $1,113,682. Schedule 1, clear and construct Big-Eddy-Troutdale 500 kv line; CA $1,030,309. Schedule 2, clear and construct Big Eddy-Troutdale 300 kv line, Wasco, Hood River, Clackamas and Multnomah Counties. Bonneville Power Admin., 827 N. E. Oregon St., Portland, Ore. Bids July 22. Awarded Sept. 4.

**Tex., Corpus Christi**—Central Power & Light Co., 120 N. Chaparall St., Corpus Christi, Tex. Owner Builds. $175,000, constr. addnl. unit of underground cable line.

## INDUSTRIAL COMMERCIAL & PUBLIC BUILDINGS

### Proposed Construction

**Del., Wilmington**—E. I. du Pont de Nemours & Co., Inc., du Pont Bldg., textile fibre laboratory. Approx. $1,000,000. H. M. Gordon, c/o owner, engr.

**N. Y., New York**—M. Lowenstein & Sons, Inc., 43 Leonard St., Zone 13, 18 story office at southeast corner of Broadway and 40 St. $5,000,000.

**R. I., East Providence**—J. J. McHale & Sons Inc., 101 Ferris St., Pawtucket, plans by R. Milton Kenyon, 124 Taunton Ave., shopping center, 20 bldgs of modern design off Newport Ave. $2,500,000.

**32 connector sizes needed on this job!**

**One connector size is plenty with this XTP!**

## For Tee or Parallel Taps!

# ONE O. Z. FITTING DOES THE WORK OF 32

One typical XTP connector replaces up to 32 different parallel or tee connectors because each XTP accommodates a wide range of wire sizes. All told, the XTP line of but 25 connectors will receive *over 400 wire-size combinations!*

For either tee or parallel taps, just snap special hinged clamp over main and tighten—the connector is permanently in place, positive contact assured. When you're ready to connect the tap, simply insert wire in tap end of connector. A wrench-turn or two and the job's done!

**25 CONNECTOR SIZES do practically all tap jobs.**
- Accommodate over 400 combinations of wire sizes
- Fit wire from #8 to 1,000,000 CM

**HINGED CONSTRUCTION for quick installation.**

**SPRING STEEL LOCKWASHERS (tin plated) maintain pressure.**
- Hold resiliency—assure permanent connection

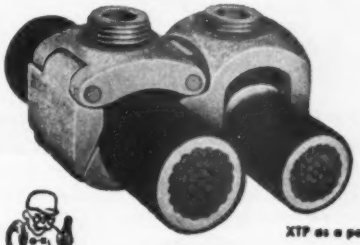
**PRESSURE PLATES designed for maximum contact and grip.**
- Serrated for firm grip
- Can not rotate during installation

**HIGH STRENGTH, HIGH CONDUCTIVITY.**
- High conductivity copper alloy for body
- Extra strength copper alloy for pressure plates and hinged parts

***Get these combination fittings from your wholesaler now . . . and put an end to bulky assortments of tap connectors.***

**CONDUIT FITTINGS • CABLE TERMINATORS**
**CAST IRON BOXES • SOLDERLESS CONNECTORS**
**GROUNDING DEVICES • POWER CONNECTORS**

XTP as a "T" tap



XTP as a parallel tap

***They're O. K. if They're O. Z.***

O. Z. ELECTRICAL MANUFACTURING COMPANY
262 BOND STREET · BROOKLYN 2, N. Y.

an ACCO product

Stainless Steel STRAND

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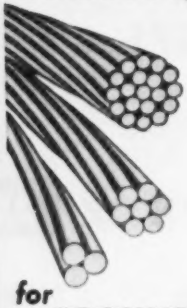
will make it again



for

GROUND
GUY
MESSENGER
CATENARY

Higher—

Corrosion resistance
Tensile strength
Elastic limit
Resistance to abrasion
Strength-to-weight ratio

Lower—

Cost per year during use

*Present restrictions prohibit our furnishing* PAGE *Stainless Steel Strand today, but it will pay you to consider it for the future.*

PAGE Strand

ACCO

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

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## BOOK REVIEWS

### AC Circuits

***Analysis of Alternating Current Circuits.*** **By W. R. LePage. Published by McGraw-Hill Book Co, New York 36, N. Y. 444 pages, illustrated. Price $6.50**

This introductory text in alternating current circuits covers the usual ground of a first course and is devoted to the steady state in lumped linear networks. More significant than that, however, is the fact that this modern text incorporates a number of recently recommended innovations in notation and explanatory techniques. For example: As soon as simple circuits can be solved, the phenomena of resonance is introduced so that the practical illustration can be drawn from tuned radio receiver circuits. The geometrical concept is given emphasis over complex numbers, which appear very late. The terms "sinor" and "phasor" are introduced to clarify distinctions between the directed lines used in ac theory. Stress is placed on "reference polarity" and "reference current direction rather than positive polarity" and "positive current direction" to avoid confusion associated with the use of positive and negative to describe types of charge and conditions of algebraic quantities. The author's choice of a system for potential difference notation is like his other notation, used because it is simple, understandable and unambiguous. It and the other innovations in this text are functional, reasoned and intelligently applied. The result is a new and refreshing approach to the teaching of alternating current circuits.

### Nuclear Reactor

***Harwell—The British Atomic Energy Research Establishment.*** **Published by the Philosophical Library, Inc., New York 16, N. Y. 128 pages, illustrated. Price $3.75.**

This book is an official documented compilation of the history of the British Atomic Energy Project. Also contained is a clear account of the experimentation and nuclear activity based on the Gleep and Bepo piles. The latter has 40 tons of uranium and is designed to produce 6000 kw. Maximum surface temperature of the working metal is 200 C.

### Transformers

***Die Messwandler.*** **By J. Goldstein. Published by Verlag Birkhauser AG, Basel, Switzerland. 211 pages, illustrated. Price 29.10 fr.**

A second edition (first 1928), this work is devoted entirely to current and voltage transformers for measurement application. Treatment is focused on design in mathematical and graphic terms.

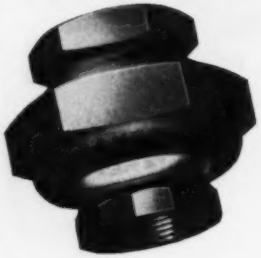
### Manufacturing

***Economics of American Manufacturing*** **by Edward L. Allen. Published by Henry Nolt and Company, New York. 566 pages, illustrated.**

Fundamental economics of basic industries with interesting illustrations make this a very readable book for the student of manufacturing. It will be of no particular interest to the electrical industry except in its coverage of the basic metals aluminum, steel, and copper. Chapters on bituminous coal and synthetic fibers are also included. This book is primarily of use to the uninitiated student.

FOR QUICK-EASY STREET LAMP ALINEMENT

use PLUMBRITE



PLUMBRITE, the new street lamp coupling that saves time, reduces installation and maintenance cost.

PLUMBRITE

*Write for Bulletin SL-11*

Saxton Co. 1421 ROSEWOOD AVE. LOUISVILLE 4, KY.

The *Original Prod-Mount Voltage Tester* is the KNOPP

***Patents Pending***

Say "Goodbye to risky time-wasting fuss in testing" with the 5 main safety features in the KNOPP Voltage Tester: (1) original Prod-mounting Socket in housing making this tester easier, faster, and safer to use and ending time-wasting "three-handed" testing; (2) protection through Dual indication of voltage by solenoid and neon lamp working independently; (3) positive scale reading; (4) signal by hum and vibration; and (5) thorough insulation throughout, even to the sharp point of each prod.

Well-built and shockproof in a LAMINATED bakelite housing, the KNOPP Voltage Tester tells immediately and simply if circuit is open or closed; magnitude of voltage between 110 and 600; a-c or d-c, pure or rectified; 25 or 60 cycles—for testing old and new circuits, fuses, locating grounds, etc.

Get the widely-used and reliable KNOPP Voltage Tester with the time-proved Prod-Mount, and other safety features from your dealer, or write for illustrated free, new descriptive Bulletin No. 425.

ELECTRICAL FACILITIES INC.
4236 Holden Street Oakland 8, Calif.

# New G-E Rapid Start lamp needs no starter, cuts maintenance

**IN THE NEW RAPID START** lamp circuit G-E has been able to eliminate the starter required in standard lamps to pre-heat the cathode. For that reason, maintenance is even easier, more economical than before.

This new General Electric *Rapid Start* lamp was made possible by two G-E developments: an improved triple-coil cathode that replaces the double coil in standard fluorescent lamps, and a *Rapid Start* ballast. Together, they give General Electric *Rapid Start* lamps almost instant starting and smooth, simple operation. •

G-E *Rapid Start* fluorescent lamps are rapidly becoming available. Many leading fluorescent lighting fixture manufacturers are incorporating the new lamps and ballasts in their latest equipment. These two newest developments of G-E research are another reason why you can *expect* the best value from General Electric fluorescent lamps.

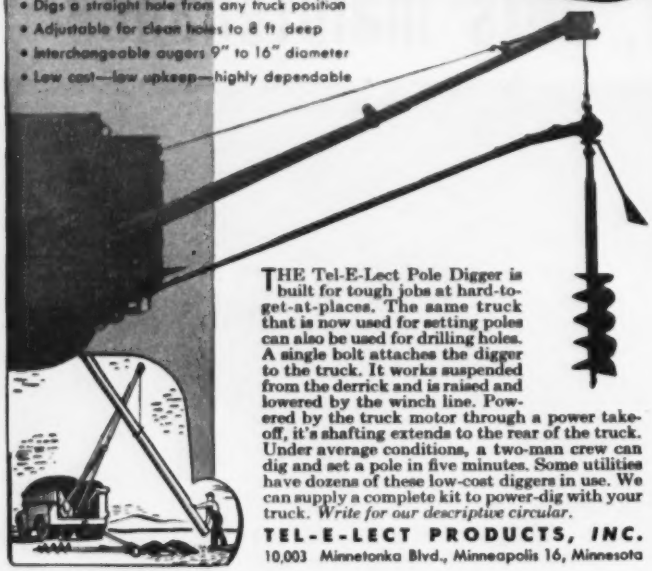
*You can put your confidence in—*

**GENERAL ELECTRIC**

# DIG HOLES WITH YOUR LINE TRUCK AND CREW

## TEL-E-LECT POLE HOLE DIGGER

- Digs a straight hole from any truck position
- Adjustable for clean holes to 8 ft deep
- Interchangeable augers 9" to 16" diameter
- Low cost—low upkeep—highly dependable

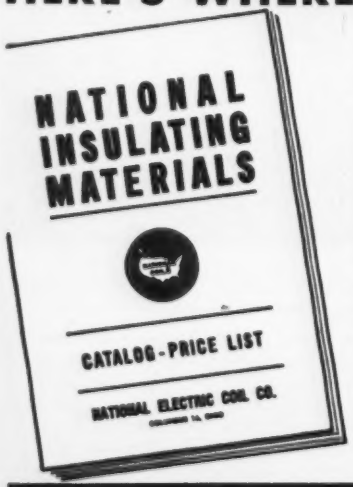


THE Tel-E-Lect Pole Digger is built for tough jobs at hard-to-get-at-places. The same truck that is now used for setting poles can also be used for drilling holes. A single bolt attaches the digger to the truck. It works suspended from the derrick and is raised and lowered by the winch line. Powered by the truck motor through a power take-off, it's shafting extends to the rear of the truck. Under average conditions, a two-man crew can dig and set a pole in five minutes. Some utilities have dozens of these low-cost diggers in use. We can supply a complete kit to power-dig with your truck. *Write for our descriptive circular.*

**TEL-E-LECT PRODUCTS, *INC.***
10,003 Minnetonka Blvd., Minneapolis 16, Minnesota



# *Need Insulation?*
# HERE'S WHERE TO FIND IT




If you use electrical insulation — a little or a lot — this pocket-size catalog-price list can be as handy as your right arm. It's free; write for it today. No searching through page after page for the item you want. Every item is carefully grouped with others of the same basic characteristics. Specifications and cost of every size or weight of every item are given. Every page is marked so clearly that you can't turn to it without knowing at a glance what's on it. First-page index lists every item, both alphabetically and by catalog number. It's really a time-saver. And when you order from it, you get quick action — you get good *insulation*. We can quickly supply special shapes and non-standard items, too.

NATIONAL ELECTRIC COIL COMPANY
COLUMBUS 16, OHIO, U.S.A.

ELECTRICAL ENGINEERS MAKERS OF ELECTRICAL COILS AND INSULATION—REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES


### Human Values in Business

***Creating an Industrial Civilization.*** **Edited by Eugene Staley. Published by Harper & Brothers, New York. 368 pages. Price $4.00**

This new book covers the discussions and conclusions of the Corning Conference sponsored by the Corning Glass Works. It is devoted to investigation of our industrial civilization from the standpoint of human values. The changed conditions due to the machine age and the solution of these problems was the central subject. The intellectual capacity and broad experience of the participants makes the report on the conference of unusual significance. Such noted men as L. D. Appley, President of American Management Association; Harold Boeschenstein, President, Owens-Corning Fiberglas Corp; along with educators from many of the leading universities gave the conference the mature, well balanced atmosphere that the editor has so ably woven into his report.

### Tax-exempt Corporate Contributions

***The Manual of Corporate Giving*** **by Boardsley Ruml, published by National Planning Association. 415 pages. Price $6.75**

This report emphasizes the opportunities that are now available for a corporation to donate to worthwhile causes at little cost to the stockholder. The device is through the 5% tax exemption for contributions to educational, scientific, and welfare activities. The sections in the book that are devoted to corporate support for higher education and research will be of particular interest to electrical industry readers.

### The P.G. and E Story

***The P.G. and E of California—The Centennial Story of Pacific Gas and Electric Company*** **by Charles M. Coleman. McGraw-Hill Publishing Company, Inc, 330 West 42nd St, New York 36, N. Y. 385 pages, Illustrated. Price $4.50**

This story focuses on the men and the leaders of men who developed the big Pacific Gas & Electric utility system. The book gives an invaluable picture of the problems involved in the consolidation of the California companies. And of even more value it contains a true account of the fights to preserve their territorial rights against the encroachment of federal power. Perhaps this latter contribution is the most timely. This is true since the records are not well supplied with factual material on this subject. However, the electric utility industry story is one in which the accomplishments of men eclipse all other factors. The PG&E story is an important contribution to the literature on this subject.

### Theory and Practice

***Electrical Engineering, Theory and Practice.*** **By William H. Erickson and Nelson H. Bryant. Published by John Wiley & Sons, New York 16. 523 pages, illustrated. Price $6.00.**

Stressing analysis and study rather than "formula substitution" this book offers an understanding of the basic theories of circuits, machines, and electronics. It has been written to meet the needs of non-electrical engineering students. Physical analysis is stressed although mathematical analysis of circuit operation and machines is not avoided. Circuits, machines and electronics are covered. Chapters relating to electronics are intended to serve as an introduction to industrial electronics. A short chapter on communications is included.

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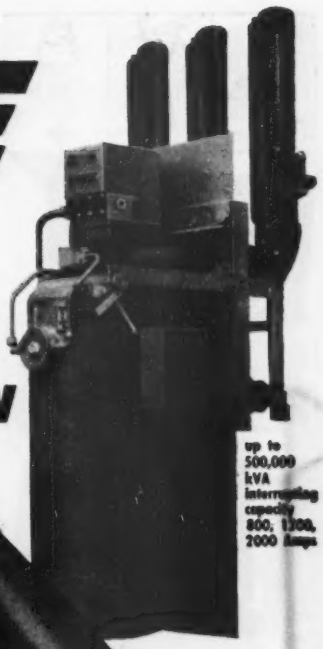

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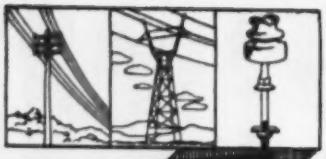

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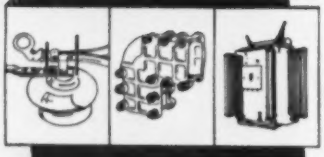

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## CATALOGS • BULLETINS

● HEAT EXCHANGERS: Griscom-Russel Co, Massilon, Ohio, has made available a catalogue of their tubular heat exchangers, cooling towers and steam generators and an extensive line of similar equipments. The bulletin sent by the company upon request, shows typical installations and descriptions.

● MICRO SWITCHES: An article reprint available from Minneapolis-Honeywell Regulator Co, Freeport, Ill, describes operations and applications of small quick-action switches. Landing gear switches, wing lock indicators cockpit lighting controls and gun turret limits are but a few of the items included. Direct requests to the company for copies.

● PUSH-BUTTON CONTROLS: A folder has just been issued by Arrow-Hart & Hegeman Electric Co, 103 Hawthorn St, Hartford 6, Conn, which describes their line of oil-tight push-button controls for varied industrial applications. Copies are available now from the company.

● ELECTRONIC TRANSFORMERS: Listing more than 450 items with specifications, Catalog TR-52 has just been released by Triad Transformer Mfg. Co, P. O. Box 17812, Los Angeles 35, Calif. Featured are hermetically sealed transformers designed to MIL-T-27 specifications, high quality audio transformers, 400-cycle power transformers, Trijet miniature transformers, toroids, general purpose transformers for radio and television replacement, geophysical transformers and amplifier kits. Copies may be had by writing to the address above.

● OVERLOAD RELAYS: A new 4 pg paper has been released by the Electric Controller & Mfg. Co., 2698 East 79th St., Cleveland 4, Ohio. Designated 1180-3 it describes in detail thermal magnetic overload relays. Copies may be obtained by writing to the company.

● POLYTETRAFLUOROETHYLENE: A new type of PTF film made from "Teflon" resin is described in a release from the Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minnesota. This film called "PTF" film, Type B gives the electrical design engineer unfused PTF film which can be used as insulation on electric conductors and components where fully fused PTF film was impractical or uneconomical. For further information on this new product write the company.

● ELECTRONIC FLOW METER: Instrumentation Data Sheet 10.35 describes the Potter-Brown flowmeter for measurement of fluids over an extremely wide range of temperatures and pressures with an accuracy of ½ %. This folder is available and will be sent free upon request to the Minneapolis-Honeywell Regulator Co., Brown Instruments Div. Station 213, Wayne & Windrim Aves., Philadelphia, Pa.

● ELECTRICAL INSULATION VARNISHES: Helpful information on varnish selection and use incorporated in a 20 pg catalog has been issued by the Insulation Manufacturers, Corp., 565 West Washington Blvd., Chicago, Ill. Varnish composition types, functions, colors processing and core are all covered. This bulletin will be sent free upon request to the Publications Department.

● FORK LIFT TRUCKS: The Buda Co., Harvey, Ill., has just released an 8 pg


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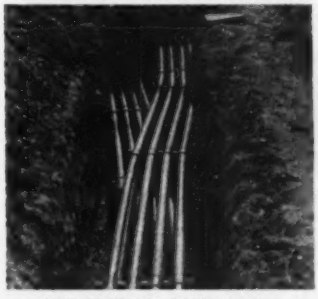

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● CONVERTERS: Descriptions of the design, types and application of the Brown 60 cycle ac-dc converters are found in a new Instrumentation Data Sheet No. 10.20-5. Electrical characteristics, applicability, wire diagrams and photographs are also included. It may be obtained from the Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Wayne & Windrim Aves., Philadelphia 44, Pa.

● PRECISION INDICATOR: The Brown Electronic precision indicator in the console type and the operators desk type is fully discussed in Specification Sheet 17-1 published by the Minneapolis Honeywell Regulator Co., Brown Instruments Division, Wayne & Windrim Aves., Philadelphia 44, Pa.

● BRONZE WELDING ROD: A new leaflet describing Entec Rod 148 FC, a new bronze welding rod with a special flux coating has recently been released. The leaflet TIS 997-P containing complete specifications and technical data is available upon request from Eutectic Welding Alloys Corp., 172 St & Northern Blvd, Flushing, N. Y.

● PLP DEAD-ENDS: Bulletin 35-200 explains the efficiency and economy of Preformed Dead-Ends plus details on how they develop the full strength of all grades of strand and conductor without any concentrated pressures that could cause conductor deformation. Copies of this catalog are available from Preformed Line Products Co., 5349 St. Clair Ave., Cleveland 3, Ohio.

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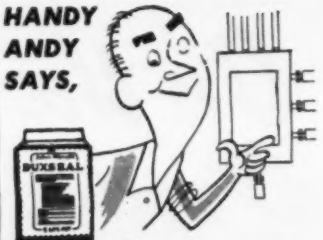


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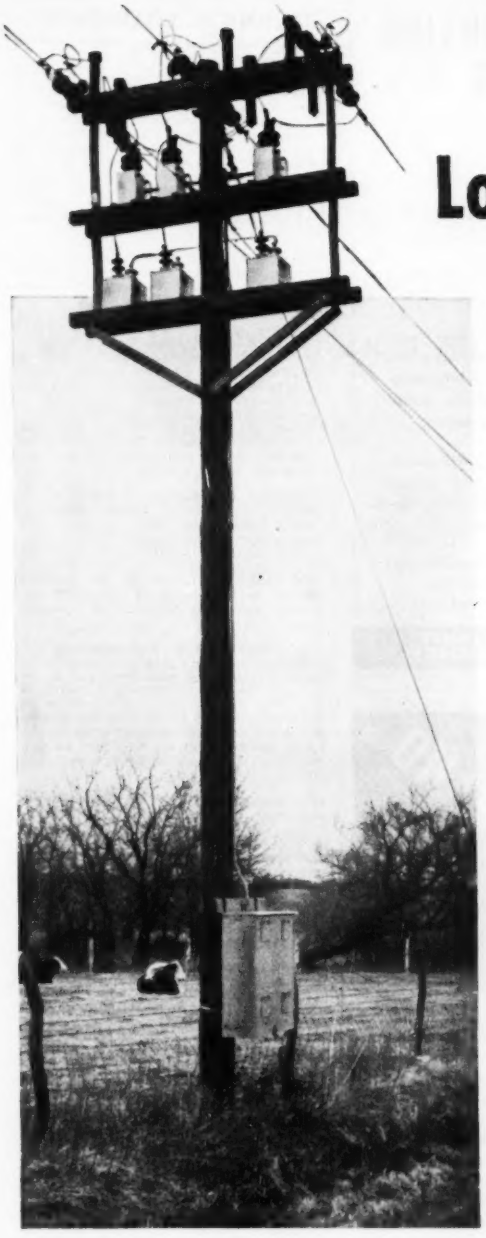

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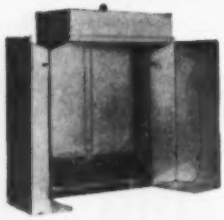

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## TECHNICAL LITERATURE

**Circuit Breakers**—A complete study of Type AB circuit breakers is given in a new 35 pg booklet made available by Westinghouse Electric Corp Box 2278, Pittsburgh 30, Pa. Photographs show of the De-Ion arc quenching action of all AB breakers: Confine the arc, divide it and extinguish it, are the first ever published. A quick guide to AB circuit breakers gives types, ratings standard and special features. Request booklet (B-5407).

**Oil Circuit Breakers**—*"Comparison Between British and American Standards for the Short-Circuit Rating, Performance, Selection and Testing of Oil Circuit-Breakers"* is the title of Publication No. 10 (price 10 shillings) issued by the Association of Short-Circuit Testing Authorities, Inc, 36 Kingsway, London, W.C. 2, England. This 16-page booklet covers such subjects as assessment of rating and performance, calculation of fault currents and selection of circuits breakers, short-circuit test code, and includes tables on comparison of rating and performance between BS and ASA circuit breakers selected for the same duty.

**Television Interference**—Reprints of 21 articles (1948-1951) from Electrical World, Electronics, QST, CQ and other magazines and supplemented with laboratory information and bibliography on causes and elimination of interference are now available. Copy free on postcard request to Laboratory of Advanced Research, Remington Rand, South Norwalk, Conn.

**Galvanometers and Dynamometers**—A complete line of standard galvanometers, dc indicating amplifiers and accessories for use in null-balance or calibrated deflection measurements is presented in the newly-revised 20 pg *Catalog Section ED* which has just been published by the Leeds and Northrup Co, 4934 Stenton Ave Philadelphia, Pa. Copies will be sent upon request.

**Flow Meters**—A new 40 pg handbook has just been published by the Fischer & Porter Co, Hatboro, Pa. to aid in the selection and sizing variable area meters. This illustrated handbook contains the results of years research and has complete description of variable area meters, tubes and floats and their comparison with valuable head meters. This hand book is free and may be obtained upon request from the company.

**Iron-Nickel Alloys**—This new 20 pg booklet just released discusses the more important "magnetically soft" alloys. Tables and graphs correlate chemical composition with magnetic properties, trade names and sources of supply. Copies may be obtained from the International Nickel Co, Inc, New York, N. Y. Address inquiries to the Development and Research Division.

**Selenium Rectifier Stacks**—A new 28 pg 2 color booklet describing the basic characteristics and applications of selenium rectifier stacks has been announced by the Lighting and Rectifier Dept, General Electric Co. Schenectady 5, N. Y. Designated as GET-2350 it contains charts, graphs, photographs and tables illustrating rectification principles.

**Electronics**—Volume 7 containing seventy-nine papers covering the proceedings of the National Electronics Conference has recently been released. It includes electronic research, development and application in audio systems, components, higher frequency measurement information theory and television and tubes. Copies are $5.00 each and can be obtained by writing S. R. Collis, Chairman N.E.C. Publicity Committee, 208 W Washington St, Chicago, Ill.

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SEARCHLIGHT SECTION
*(Classified Advertising)*
H. E. Hilty, Mgr.


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*When Life's at Stake Rely on...*

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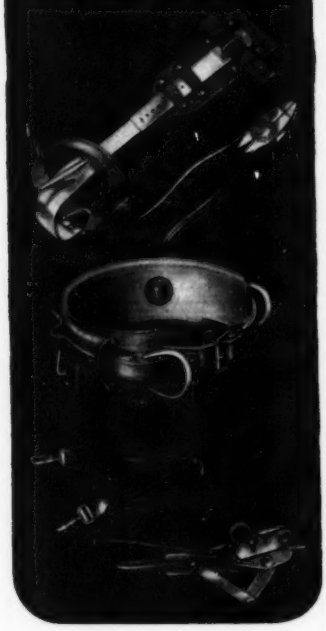

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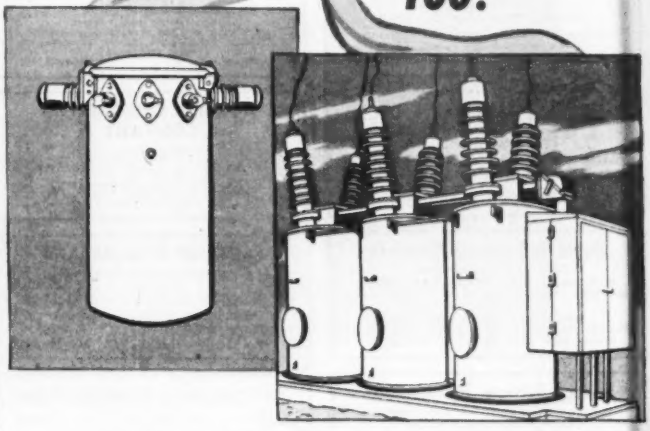

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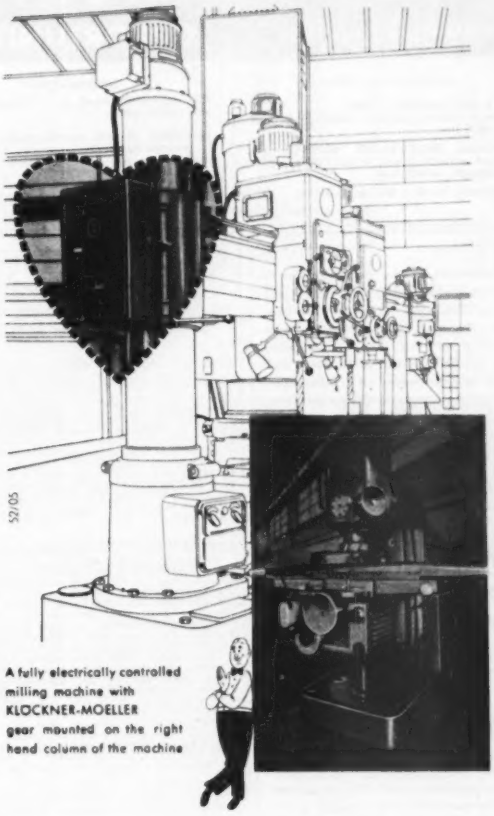
## The Heart of a Machine-Tool



A fully electrically controlled milling machine with KLÖCKNER-MOELLER gear mounted on the right hand column of the machine

Machine-tools with their complicated mechanisms are almost comparable with human beings. As in their case, the performance depends on the cooperation of all parts. The switchgear installed in modern high precision machine-tools is the controlling unit which starts and checks the various operations. The value of machine-tools depends largely on the efficiency, reliability of operation, and the life of the switchgear. Klöckner-Moeller switchgear is known to meet efficiently these requirements. It is available in attractive, hermetically closed steel cabinets, ready for immediate connection. The life of this equipment will be equal to that of the machine, without requiring any service.

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**TENNESSEE VALLEY AUTHORITY**
*Division of Personnel*
KNOXVILLE TENNESSEE

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P-5082, Electrical World
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WANTED: MANAGER for small circuit breaker manufacturing business. P-5347, Electrical World.

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*With Administrative Background*

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PW 5249 Electrical World
520 N. Michigan Ave. Chicago 11, Ill.

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**POWER PLANTS, SUBSTATIONS, TRANSMISSION LINES AND CONSTRUCTION**
*Send for new list to*
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**PIERCE CABLE CO.**
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WIRE — CABLE — WIRING MATERIALS
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*Meters*
**and for sale.**
**Particulars please.**
***ATLANTIC* Electric Meter Corp.**
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### U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-3798) will be received at Denver, Colorado, until October 23, 1952, for furnishing nine 161- and 230-kv-insulated, 400/800- to 5- and 200/600- to 3-ampere, single-phase, double-primary, outdoor current transformers; and six 161- and 230-kv-insulated, 92,000- to 65.71//115- and 138,000- to 69//115-volt, single-phase, double-secondary, outdoor potential transformers for Davis and Parker Switchyards, Davis Dam Project, Arizona-California. Delivery is desired within 300 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver, Colorado.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-3795) will be received at Denver, Colorado, until October 16, 1952, for furnishing one 60-cycle, 3-winding, class OA, outdoor power transformer, having a high-voltage winding rated 20,000-kva at 110,000/66,500 volts, a medium-voltage winding rated 15,000-kva at 25,200 volts, and a low-voltage winding rated 20,000-kva at 4,000 volts, and with tank-mounted lightning arresters; one 115,000-volt, 3-pole, 800-ampere, 1,500,000-kva, power circuit breaker; one 23,000-volt, 3-pole, 600-ampere, 250,000-kva and three 14,400-volt, 3-pole, 2,000-ampere, 1,500,000-kva, outdoor, power circuit breakers; and, several 115,000-, 23,000-, and 7,500-volt, 2,000- and 600-ampere, three- and single-pole, outdoor air switches for Rapid City Substation, Missouri River Basin Project, South Dakota. Delivery is desired within 450 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver, Colorado.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-3800) will be received at Denver, Colorado, until October 23, 1952, for furnishing three 3,000-ampere bus structures, with instrument transformers, generator-protective equipment, and switches, for Folsom Power Plant, Central Valley Project, California. Delivery is desired within 480 to 600 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver, Colorado.

## SUBSTATION EQUIPMENT

### TRANSFORMERS

| QU. | KVA | MFR. | VOLTAGE |
|---|---|---|---|
| 4 | 833 | Pitts. | 66000/33000—13200/23000 Y |
| 3 | 333 | G. E. | 69000-2400/7200 |
| 3 | 300 | Pitts. | 66000—2300 |
| 3 | 75 | A. C. | 66000/24000—7200/12470 Y |
| 3 | 200 | West. | 44000—2400/7200 |
| 4 | 150 | West. | 44000/23000—2300/6900 |
| 1 | 100 | G. E. | 44000—2300 |
| 1 | 75 | West. | 44000—7200/12470 Y |
| 3 | 3333 | West. | 43000—13800 |
| 3 | 5000 | G. E. | 38100/66000—6600 |
| 1 | 18750 | A.B.B. | 34840—11000, 3 ph. |
| 4 | 2000 | A. C. | 34500—6900/11950 |
| 4 | 200 | G. E. | 34500—230/460 |
| 3 | 100 | West. | 33000—240/480 NEW |
| 3 | 100 | A. C. | 33000—7200/12470 Y |
| 3 | 75 | Wag. | 33000—7200/12470 Y |
| 4 | 450 | A. C. | 25410/44000—13280/23000 |
| 6 | 100 | G. E. | 22000—7200/13470 Y |
| 9 | 50 | G. E. | 22000—2300 |
| 3 | 371 | G. E. | 22000—6900 |
| 1 | 6000 | Mni. | 13800—460, 3 ph. |
| 6 | 200 | G. E. | 13200—2300 |
| 3 | 200 | G. E. | 13200—230/460 |
| 4 | 750 | G. E. | 11000—440 |
| 2 | 250 | Pitts. | 7200—220/440 |
| 3 | 150 | Wag. | 6900—2300 |
| 3 | 371 | G. E. | 6900—230/460 |
| 2 | 100 | G. E. | 4800/2400—480/240 |
| 2 | 1000 | A. C. | 2300/4000 Y—2300 |
| 3 | 333 | G. E. | 2300—230/460 |
| 1 | 100 | G. E. | 2300—575, 3 ph. |
| 6 | 50 | West. | 2400—114/228 DRY TYPE |
| 3 | 30 | West. | 2300—575 |

### INDUCT. REGULATORS—OUTDOOR

1— 140 KVA G. E. 200 A. 4000 V. 3 ph.
4— 60 KVA West. 250/500 A. 2400 V. 1 ph.
6— 48 KVA G. E. 200 A. 2400 V. 1 ph.
8— 35 KVA West. 150/300 A. 2400 V. 1 ph.
2— 36 KVA G. E. 75/150 A. 4800 V. 1 ph.

### CIRCUIT BREAKERS

1— 600 A. 73 KV G. E. FHKO-236-500 MVA
1— 400 A. 87 KV G. E. FHKO-236-500 MVA
1—1200 A. 15 KV G. E. FKO-139-350 MVA
4— 600 A. 15 KV G. E. FHKO-139-750 MVA
2— 600 A. 15 KV G. E. FHKO-136-1250 MVA
1— 400 A. 15 KV G. E. FHKO-136-350 MVA

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180 P.S.I.—585°F Total Temp.
3 phase 60 cycle 2300 volt
With Surface Condenser
GOOD CONDITION
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**OPPORTUNITIES**
*Whatever your need—*
think "SEARCHLIGHT" FIRST

## FROM AVAILABLE STOCK

### TURBO GENERATORS

| Qu | KW | Make | Desc. |
|---|---|---|---|
| 1— | 6000 | Al. Ch. | Condensing 200/250 I.S.P. 2300 v 3/60 Ext & Surf or Cond. |
| 1— | 750 | G.E. | Condensing — 425 lbs. 750 TT I.S.P. 440 v 3 ph. 60 cy.— Built 1946 |
| 1— | 500 | Moore | Non-condensing 150/200 lbs. I.S.P. 5/15 lbs. G.B.P. 2/60/480 volt Direct Connected Exciter |
| 1— | 400 | Westg. | Non-condensing — 135/150 lbs. I.S.P. 5/10 lbs. B.P.— 440/480 v. 3 ph. 60 cy. |
| 1— | 800 | G.E. | Non-condensing 150/175 I.S.P. 5/10 B.P.— 480 v. 3 ph. 60 cy. |

### SYNCHRONOUS CONDENSERS

| KVA | Make | Type | Volts | Speed |
|---|---|---|---|---|
| 1—6000 | Whse. | | 2400/4160 | 600 |

### MOTOR GENERATOR SETS

3 ph. 60 cy.

| Qu | KW | Make | Speed | DC Volts | AC Volts |
|---|---|---|---|---|---|
| 2— | 2000 | G.E. | 514 | 600 | 6900/13800 |
| 1— | 1500 | G.E. | 600 | 600 | 2300 |
| 1— | 1250 | G.E. | 514 | 600 | 2300 & 6900 |
| 1— | 1250 | G.E. | 720 | 600 | 13800 |
| 1— | 1000 | G.E. | 600 | 275 | 2300/4160 |
| 1— | 1000 | G.E. | 514 | 600 | 6600/13800 |
| 1— | 1000 | G.E. | 600 | 600 | 4160/6600 |
| 1— | 1000 | G.E. | 600 | 600 | 2300/4160 |
| 2— | 1000 | Whse. | 900 | 600 | 2300/4160 |
| 1— | 800 | Whse. | 900 | 600 | 6600/13800 |
| 1— | 800 | Whse. | 1200 | 115/230 | 2300 |
| 1— | 800 | Whse. | 1200 | 115/230 | 440/2300 |
| 1— | 800 | Whse. | 900 | 230 | 440 |
| 1— | 750 | G.E. | 720 | 275 | 2300 |
| 1— | 600 | G.E. | 720 | 230 | 440/2300 |
| 1— | 350 | G.E. | 900 | 125 | 4160 |
| 1— | 250 | G.E. | 1200 | 275 | 2300 |
| 1— | 150 | Whse. | 1200 | 275 | 2300 |

### TRANSFORMERS—60 Cycle

| KVA | Make | Type | Ph | Voltages |
|---|---|---|---|---|
| 2—1250 | G.E. | HVDDJ | | 6600x550 |
| 1—1150 | A.C. | OBBC | | 13200x480/24000 |
| 3—1000 | G.E. | HVDDJ | 1 | 2300x480 |
| 9— 300 | G.E. | HT | 3 | 24000x240/480 |

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OFFICE & SHOP
51 Howell St., Jersey City 6, N. J.

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FOR
IMMEDIATE SHIPMENT
UNIT CAPACITIES—10 TO 1875 KVA
A.C.—50 AND 60 CYCLES
VARIOUS VOLTAGES

### A PARTIAL LISTING OF OUR INVENTORY

| KW | Make | Model | HP | RPM | KW | Make | Model | HP | RPM |
|---|---|---|---|---|---|---|---|---|---|
| 1134 | Fairbanks Morse | 38D | 1600 | 720 | 320 | Enterprise | D9G-6 | 560 | 450 |
| 1100 | General Motors | 16-278A | 1600 | 720 | 300 | General Motors | 8-268A | 450 | 1200 |
| 1000 | General Motors | 16-567B | 1440 | 720 | 200 | General Motors | 8-268A | 350 | 900 |
| 750 | General Motors | 12-567 | 1080 | 720 | 100 | General Motors | 3-268A | 150 | 1200 |
| 500 | General Motors | 8-278A | 750 | 720 | 100 | Worthington | BB-6 | 180 | 600 |
| 500 | General Motors | 8-567 | 720 | 720 | 60 | General Motors | 6-71 | 90 | 1200 |
| 350 | Baldwin | VO-6 | 410 | 450 | 30 | Internat'l Harvester | UD-14 | 45 | 1200 |
| 320 | Buckeye | 80 | 480 | 600 | | | | | |

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ENGINE DIVISION, 50 CHURCH ST., NEW YORK 7, N. Y.

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1—1500 KVA G.E., 3 Ph., 4160V, 2300V Pyranol
1—1500 KVA Penn. 3 ph., 4150V. Y 2400V Delta
2— 400 KVA Pitts., 1 Ph., 2400/4800V pri. 240/480V sec.
1— 200 KVA G.E., 3 Ph., 2400-220 Sec.
2— 100 KVA Wagner, 1 Ph., 240V pri., 120V sec.
9— 50 KVA G.E., 1 Ph., 13,400V. 120/240 Sec.

### SYNCHRONOUS MOTORS

1— 300 H.P., Elec. Mach. 720 RPM., 3 Phase 60 cyc., 2200V T E F Cooled Outdoor service.
1— 150 H.P., G.E., 1800 RPM, 220V.
2— 150 H.P., Al. Chal. 380 RPM, 440V.

### MOTOR GENERATOR SETS

1—1000 KW G.E., 600 V. 514 RPM, 4000V 3ø.
1— 300 KW Whse., 275V. 900 R.P.M., 220 V 3ph.
1— 175 KVA West., 1Ph., 220V. Motor 3Ph., 440V
1— 150 KW. G.E., 125/250V. 1200 RPM, 2300 3ph
1— 100 KW G.E., 250V. 900 RPM, 2300V, 3ph.
1— 75 KW C.W. 250V, 1200 RPM, 2300/3150V3ph.

### SLIP RING MOTORS

1— 200 H.P., West. CW. 600 RPM, 440V.
1— 250 HP West., CW. 600 RPM, 440V.

### SYNCHRONOUS CONDENSER

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1—2500 KVA Whse., 720 RPM, 2200V with DCEXC.

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**Heavy galvanized strap** base and screw.

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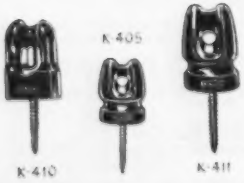
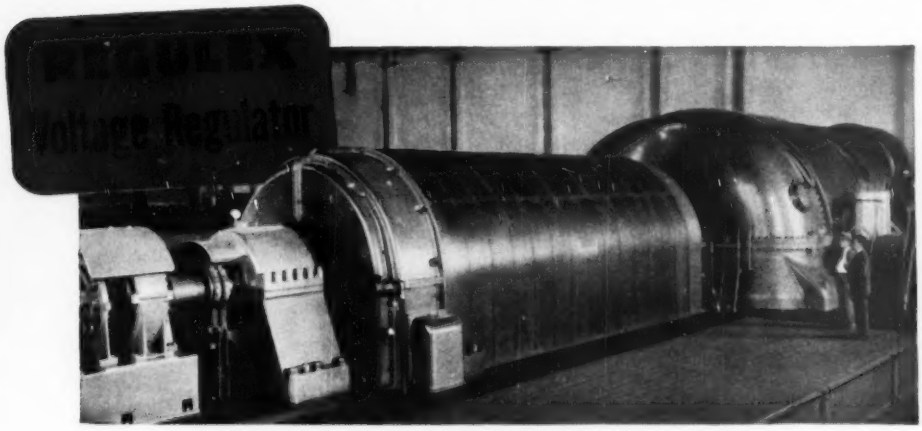



**KNOX PORCELAIN**
**CORPORATION**
KNOXVILLE 1, TENNESSEE

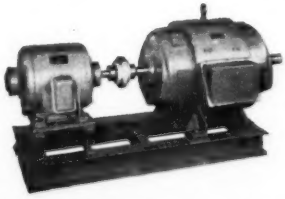
# MEET NEW DEMANDS

## ON OLD GENERATORS WITH

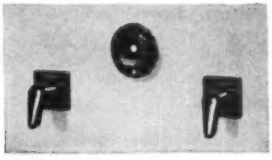



**WHEN POWER DEMANDS GROW,** increase your available generator capacity by increasing the safe operating limits. Install *Regulex* voltage regulators. They will automatically keep the field current high enough for stable operation — assure a safe minimum field current for any power factor load. The fast acting *Regulex* voltage regulator will also minimize the effect of system disturbances caused by sudden load changes or fault conditions.

### *Regulex* Control is Accurate . . . Simple to Adjust and Maintain



**THE MOTOR-DRIVEN** *Regulex* exciter is conservatively rated for long life. Since it's similar in construction to a dc generator, the same periodic inspection routine can be followed. No special training of maintenance personnel is required.



**ONLY THREE** operating controls needed: (1) a control switch places regulator in and out of service; (2) a second switch controls the motor-operated main exciter field rheostat; (3) a voltage adjusting device selects proper ac regulated voltage.

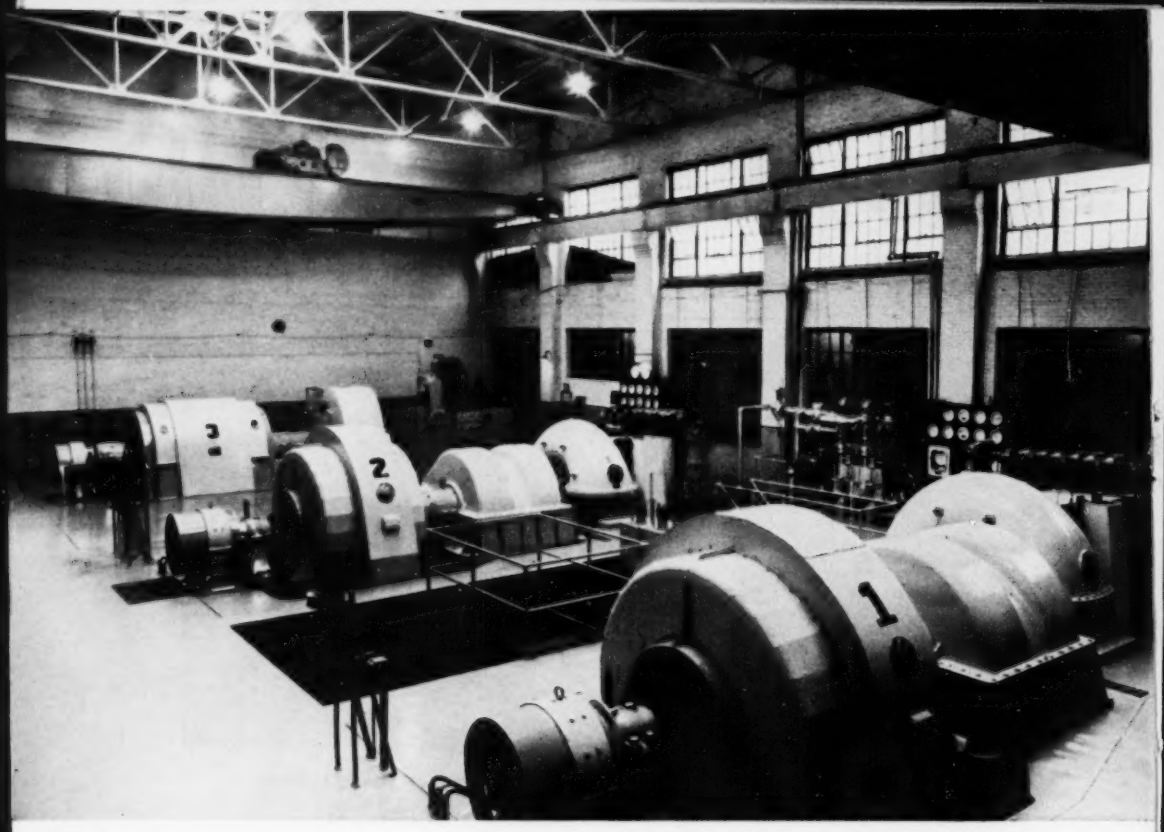
**COMPONENTS** of the *Regulex* voltage regulator in this cabinet have no moving parts, require no maintenance or adjustment after installation. This single control cubicle can be placed in any convenient spot or combined with switchgear equipment.

★ **You can use *Regulex* voltage regulators on alternators, synchronous condensers, and large synchronous motors. In every application, *Regulex* control gives fast response, provides accurate, sensitive voltage control. See your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.**

*Regulex* is an Allis-Chalmers trademark.

A-3770

# ALLIS-CHALMERS



# 17-year record shows savings you can make with...

**NONPAREIL**
TRADE MARK
**Turbine Oil**

• Turbine oil changed every three years, oil systems cleaned every year, filters cleaned every four months . . . that was the oil system maintenance routine in the power plant of a mid-west paper mill before the switch was made to NONPAREIL Turbine Oil.

Recommended by a Standard Oil lubrication specialist, NONPAREIL has been used for 17 years in the plant's two 4,000-KW units and for 12 years in its 5,000-KW unit. The original fills of oil have never been removed from the turbines. Neutralization numbers have remained below 0.09 mg. KOH/gm. The oil systems have never needed cleaning.

While the lubricant and maintenance savings already realized by this power plant are impressive, they are just a beginning. Trouble-free lubrication and consequent savings are *assured for the life of these turbines.* This is based on the written guarantee, given with each fill of NONPAREIL, that this unique lubricant will last as long as the turbine, and that its neutralization number will stay below 0.15 mg. KOH/gm.

A Standard Oil lubrication specialist will be glad to show you record after record, each covering over 20 years' operation, where NONPAREIL has eliminated oil replacements, oil system cleaning, and troubles caused by excessive oil acidity. All you need do is phone your local Standard Oil (Indiana) office. Or, write Standard Oil Company, 910 South Michigan Ave., Chicago 80, Illinois.

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